# Trade Marches On!

JUNE was a big month in every way. There was more activity witnessed in those thirty days than in any other month in recent history.

Businesswise, it was a honey. The second quarter of the year closed with June and it was by long odds the best quarter of any like period in five years.

The semi-year figures also show that the first six months of 1936 topped any previous six-month period in five years. Business activity registered 74.7 per cent of normal in June compared with 62.7 per cent a year ago and "trade marches on."

The paper industry made its contribution to the general business recovery by turning in the best volume of business done in five years. All of the mills of the industry show an operating increase of 11.9 per cent over a year ago. The board industry, the great tonnage division, in June showed a clean 10 per cent increase over May of a year ago and 6 per cent over June of 1935. The kraft paper division, another healthy growing segment of the industry, shows a 14½ per cent increase in tonnage shipped for the first six months of 1936 as compared with the same period of 1935. In the three months of the second quarter, ending June 30, the shipments into the market averaged 86.4 per cent of the mills' capacity.

The forecast for the next quarter is particularly bright and shows a continuation of increased tonnage contrary to the seasonal activity. All business divisions are going into July with expanded orders and all division operations are hitting on high.

Of particular interest are the figures given out by the automobile industry, which showed production of 103,000 units last week, where less than 100,000 were expected—where decline was predicted, an advance occurred.

The electric power consumption reached an all time high the last week of June with an increase of 14½ per cent over the corresponding week of last year.

Steel made a mid-month return to the high point in five years; namely, 71 per cent of capacity. Last week of June, the steel mills stepped up their operations to 74 per cent, a new top and the highest operating point in six years.

Building and construction is now hitting its stride and from now until snow flies in the north temperate zone, all previous building statistics in the past five years will be broken.

Back and behind all these more dramatic activities lies the durable goods industry, which has shown steadily increasing resumption in the past six months. Comparisons in some divisions like demand for electric generators and Diesel engines show increases figured by one hundred per cent over a year ago. And last, but not least, the return of the railroads to the markets for all kinds and character of supplies from rails and engines to spikes and ties not only has increased in volume, but the buying is augmented each month. "Trade marches on."

Business is not staging a come-back; it is back.

Confidence in the certain recovery of American industry is not a thing of the future.

Confidence has returned. It is being evidenced every day in every portion of this country.

Prosperity is returning as *trade marches on.*

# + EDITORIAL +

## Where Is the Main Office?

WELL-MARKED highways are now one of the things that are just taken for granted by the average citizen. Once knowing the route numbers, it is possible for an individual to travel between near or distant points without further resorting to maps or to questioning.

Road markers are designed for clarity, and, under ordinary circumstances, are installed where they can be seen. Even the inexperienced driver with perhaps not the best eyesight would have difficulty in losing himself on a main highway if only ordinary powers of observation were used.

Cannot the average pulp and paper mill profit from such an example?

For instance—where is the main office of your mill? Is is easily accessible to the stranger who may desire to see you and whom you may be interested in having make the contact, or is it so located that the new visitor might grow discouraged before finding it even though he had located the mill?

What has been said about the main office applies equally well to each departmental office within the mill.

Why not make it easy for legitimate callers at your mill to find the executive personnel whom they desire to see? Arrange to have suitable signs placed at strategic places that these individuals may be guided quickly and easily to the proper place without forcing them to make one inquiry after another of employees about the mill.

Such a consideration of the feelings of your callers will be appreciated by them and cannot bring you any regrets.

## Red Letter Days

THE Grand Rapids Convention of the American Pulp and Paper Mill Superintendents Association scored a knockout.

It will go down in the history of the industry as one of the most successful meetings, if not the most successful convention, that has been held to date by the organization.

Never once during the three-day session did it lack the punch. It got off to a good start on the morning of June 24 and was going equally strong when it closed on the evening of the 26th.

Real credit is due to the association as a whole for the holding of this highly successful meeting, but more specifically is credit due to the general chairman of the convention and to his committee, who, together, must have worked whole-heartedly and earnestly from the time preliminary plans were drawn until the meeting actually became history.

The program clicked from start to finish. It was well rounded. There was something in it for everyone — fellowship, entertainment, inspiration and knowledge.

Old friends found in it an opportunity to meet again and to talk over experiences of other days. The newcomer also had the chance to be seen and heard. It was a friendly meeting.

The entertainment was of the highest order. Yet there was plenty of variety in it. Never was there a dull moment at any of the luncheons or banquets. The chairman of the entertainment committee saw to that.

Inspiration came not only from numerous pleasant, personal contacts, but from several highly interesting and illuminating addresses. These addresses will be remembered for a long time by all those who were privileged to hear them. Then, too, there were the formal sessions and the exhibits of manufacturers. These sessions and exhibits could hardly be anything else than an inspiration to any one who was actually interested in his job.

The formal sessions certainly presented plenty of food for thought, regardless of the specific interest of the individual in the manufacture of either pulp or paper, or both. The exhibits demonstrated tangibly and concretely some of the important recent advances that have been made in the design of equipment and in the development of better chemical raw materials for the pulp and paper making industry.

The days, June 24, 25 and 26, 1936, the days on which the convention was held, will prove to be red letter days in the history of events of the American Pulp and Paper Mill Superintendents Association.

## How Blotting Paper Was Discovered

AN INTERESTING item of paper history is given in an article recently published in *The Du Pont Magazine*. In this article, entitled "Pounce, Pens and Blotting Paper," the author, Ansco G. Bruinier, Jr., relates how blotting paper was discovered accidentally in a mill not far from Wallingford, England, when paper was still being made by hand.

It seems that a beaterman forgot to put animal glue into a batch of stock. And the finished paper was soft, absorbent and almost useless. The mill owner was greatly displeased, but this mistake proved a very fortunate one, for someone with a quill pen attempted to write some instructions on a scrap of this waste paper, and the ink spread so that his script was difficult to read. The individual immediately realized that paper with such properties might serve as well as, or better than, pounce, this being the name given to the fine sand then used to blot freshly written script.

From that time, the manufacture of blotting paper became an essential part of the paper industry.

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# CURRENT THOUGHT

## This Is the Age of Change

WILLIAM SIBLEY

IN THE March, 1929 issue of THE PAPER INDUSTRY I wrote an article under the above title, that article being a sequel to a similar one appearing in the January issue of that year. Those two articles pointed out a few of the multiple changes which were then transpiring in the fields of science, chemistry and engineering. Let us now consider this subject from the psychological, social and philosophical angles.

For generations every youngster in this country has been taught, almost from birth, that the saving of money, thrift, even frugality, are basic essentials in life. "Put your money away for a rainy day" has been the stock advice of every elder. Last year, in a single six-month period, it was reported that over ten million people enrolled under the Townsend banner for the acquisition of an old-age pension of $200 per month with the pledge that they would spend every cent of that monthly endowment before the current calendar leaf fell!

Since before the Civil War, lotteries and sweepstakes have been illegal in practically every state in the Union. Today, it is reported, more than one hundred municipalities, and at least twenty sovereign states, are seriously considering lotteries as a means for raising needed funds.

Probably every reader of this article has been assured several times that "You can't get something for nothing." Yet about a year ago the "send-a-dime" chain letter lunacy swept the nation and attained such proportions as to classify itself as one of the major phenomena of this generation.

When I was a youngster of sixteen (back in the days when a well-known chewing tobacco company distributed a billboard assuring the populace that: "Men Who Chew Are Men Who Do"), I was earnestly requested by my aunt never to smoke cigarettes. She said that the paper was poison and that if I insisted upon smoking the anathematical weed I should become an addict of the pipe or smoke a cigar. Today, not only that same lady, but hundreds of thousands of other comparable ladies, are smoking—cigarettes!

Years ago we used to sing "On the Banks of the Wabash" or "Swanee River" because they were essentially sweet, melodic and sentimental. Today we sing about "Ol' Man River," or perhaps "Wagon Wheels"—because, perhaps, they are a combination of cruelty and tenderness, as well as being ironic and a bit complicated.

A few years ago the entire nation stormed over the showing of "September Morn," in itself a rather delightful delineation of that most graceful of all material things—the feminine figure. Today those of us who still appreciate realism see living and moving exhibitions of such figures (*en masse*) on the stage and screen, while the balance of us go into rapture over "Nude Descending the Stair" (which, to me, looks like nothing so much as a shattered windshield).

Not so very long ago we read with avidity and in full the speeches of our politicians, and more especially of the candidates to political office. Thousands of people, not so long ago, read the *Congressional Record* regularly. Today, the circulation of the *Congressional Record* is almost nil, and if it isn't exceedingly convenient to listen to a political speech over the radio we want that speech digested for us by some biased newspaper editor, then fed to us in headlines and sub-captions.

Prior to about 1920, political campaigns were bitterly-fought contests waged between two great parties. More recently we have tended toward political "landslides", regardless of party. There are still two parties, but apparently neither holds the same grip it formerly enjoyed. Rather than indicate an enlarged measure of "nonpartisanship" or "independence" it seems to me this trend indicates enlarged apathy and inattention; that we have become a people spasmodic.

During the past few years (which have shown such a remarkable increase in the number of pacifists and preachers of repugnance against war) we have permitted the development of uncounted bandits, gangsters, kidnapers and murderers. We are a peace-loving people who love violence to the extent of jamming the funerals of gangsters and pouring millions into the coffers of newspapers who scream scandal and murder.

Doubtless the majority of our citizenry is opposed to the principles of political dictatorship. For the majority of us, the basic ideas underlying Stalin, Mussolini or Hitler are anathema. Yet during the past three years we have eagerly sought to give into the hands of one man powers almost equal to those possessed by the three named. And when our self-made "dictator," in 1931, established the NRA and the AAA, the majority of us hailed their institution with delight. In 1935 the majority of us danced in glee on their graves.

Truly this is the age of change—the difference between today and 1776 being that the Minute Men of the Revolutionary Period had a definite goal; whereas we, the minute people of America, apparently have no goal—and don't care! It's a great life—if you can keep up with it!

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

# The Disintegration of Wool Felts

LOUISE E. McGRATH

WHAT is wool? This is a very simple question, but it is one which requires for an answer all the latest and most accurate methods of analysis, as well as the broad imagination which seems to be the companion of the highest type of scientific mind.

What is wool? It is that particular skin covering of various animals, Angora goats, or merino sheep, as an example. It may be long or short, straight or curled. It may be tan, or it may be black in color. We know that it is made into clothing for the human body and that it may be dyed many and various colors. In the paper industry, we know that it is made into paper-machine clothing, and as such, is one of the important items of cost in the manufacture of various grades of paper and board.

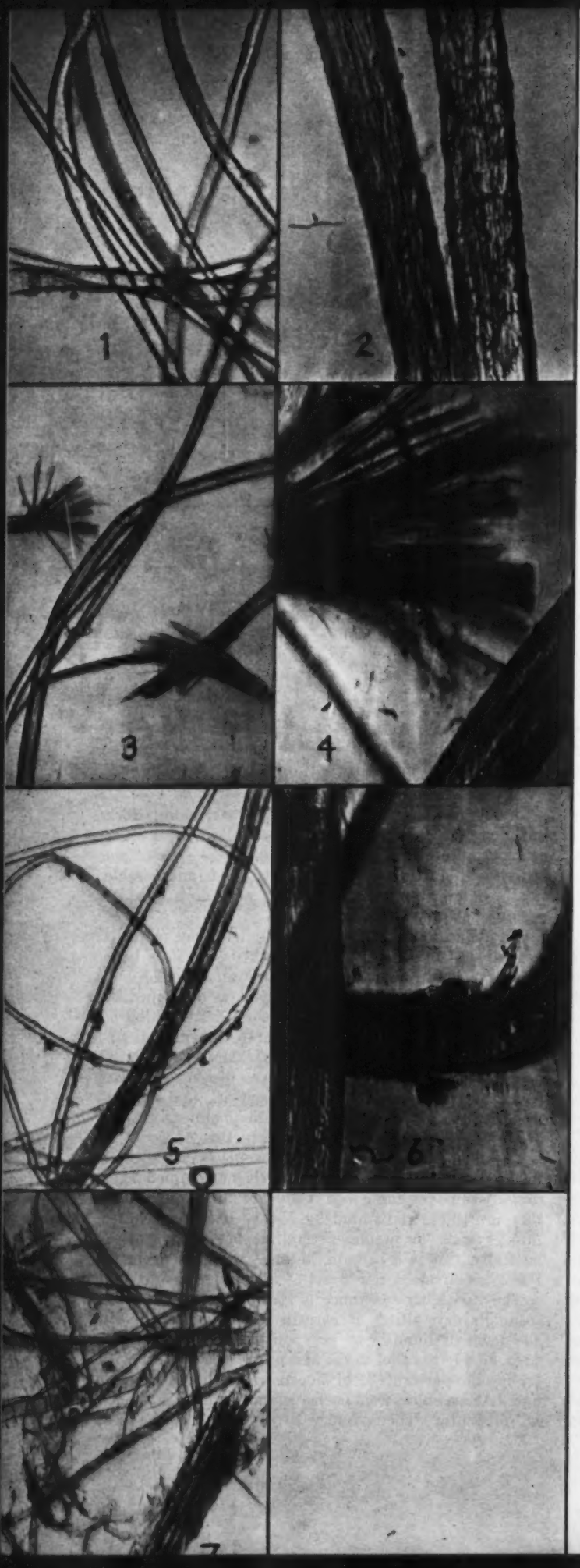
Examining wool somewhat more closely, we find that it is a long, fine, and thread-like material which we can stretch slightly between our fingers. Putting several of these strands under a microscope we can see, as in Figure 1, long tubes which seem to be covered with cross striations. When we increase the magnifications as in Figure 2, the cross lines become clearer and beneath the covering appear to be parallel tubes running lengthwise of the fiber. The component elements (1) of the wool fiber are, therefore, long tubes which are called "cortical cells," and the covering of the tubes, which is composed of "epithelial scales."

Wool fibers, as well as natural silk and animal hairs in general, belong (2) to that class of biological compounds known as the proteins, nature's grandest work in the architecture of the molecules. All of these fibers are crystalline in structure, if we allow as a definition of crystalline that which is constructed of innumerable small bodies, atoms and molecules, according to some regular pattern.

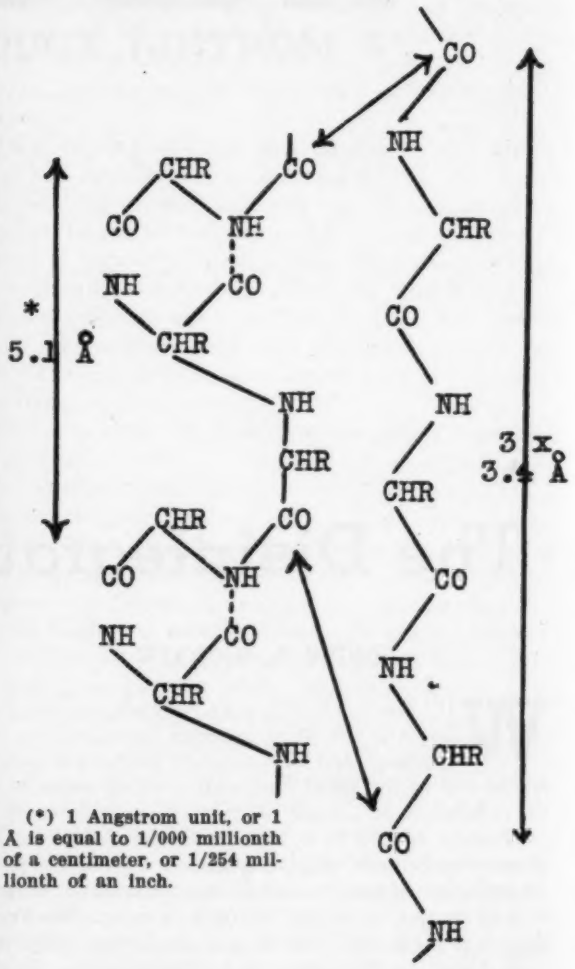
Our definition of wool must include X-ray methods of analysis as well. By these methods, crystals have been revealed in almost every solid, even in cotton and silk, as well as wool. Crystallography, as developed by the methods of X-ray analysis, is the interpretation of chemical formulae in terms of three dimensional arrangement of atoms and molecules. Any collection of molecules (3) in the form of a three dimensional pattern, however small, constitutes a crystal, and will reflect X-rays in a more or less regular manner.

The fundamental basis of such a picture of wool (4) is a system of long, thin, submicroscopic crystals which lie either parallel to the fiber axis or inclined at a roughly constant angle to it. These are much longer than they are thick, and found by X-rays to be aggregated into crystals, or pseudo crystalline bundles. Fundamentally, this is a protein, keratin, which is probably the common molecular basis of all epidermal growth.

The wool fiber substance is formed from long, thin, insoluble crystallites of keratin which is probably in the form of bundles of polypeptide chains lying approximately parallel to the axis of the visible fiber with its specific pattern (5) of sidechain and backbone linkage. As we know, wool is elastic and it can be stretched within limits. The ordinary X-ray picture of the wool




fiber is a diffraction pattern arising from the above polypeptide chains which exist normally (3) in some folded state. The X-ray photograph of stretched wool differs from this, but a relationship can be traced. By using the methods of chemistry, X-rays, mathematics, and imagination, the fundamental relationship of stretched and unstretched wool may be illustrated by the accompanying formula.




(*) 1 Angstrom unit, or 1 A is equal to 1/000 millionth of a centimeter, or 1/254 millionth of an inch.

Realizing that wool is after all a protein, one of the important sources of food for "man and beast," is it difficult to grasp the fact that the wool of paper machine felts can be a source of food for bacteria? Moisture is present, the temperature is appropriate, and bacteria can reach the felt either in the water used to wash it, or in the stock which is carried by the felt. Beckwith states (6) that slime bacteria have been isolated in raw water taken from the vicinity of mills upon a number of occasions. He has found that slime-forming bacteria are readily isolated from the water-soaked portion of wood, but are also found in part where the water has penetrated. Baker believes (7) that slime is caused primarily by aftergrowths of organisms that originally find their way into the system, quite as much through sources of contamination within the mill as from the mill water supply.

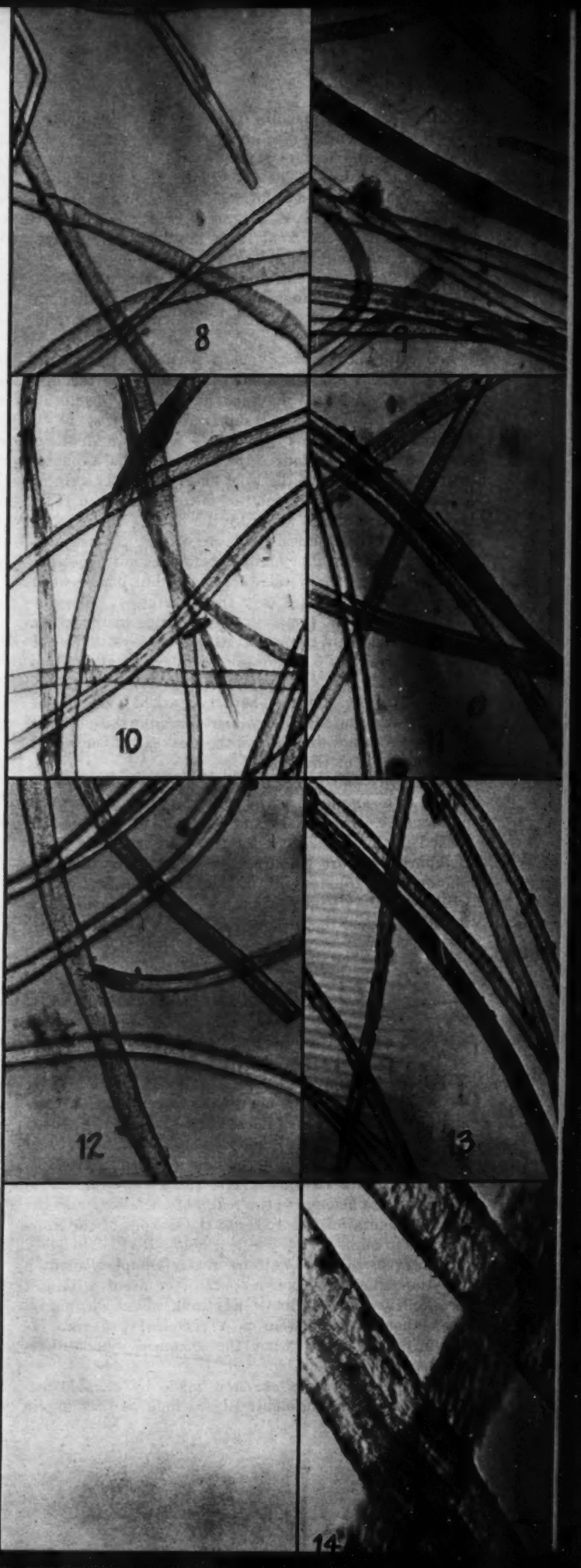
After the source of the bacteria reaches the felt, certainly the manner of use of paper machine felts provides favorable conditions for growth. The felts are run in a wet condition and the temperature may reach as high as 40 deg. C. (104 deg. Fahr.). C. M. Baker reports, in the article referred to above, that a very objectionable condition existed in a mill white water tank in which the temperature was 45 deg. C. (113 deg. Fahr.). R. Burgess in his article (8) states that he has demonstrated that one particular kind of bacteria attacks wool at a temperature of 55 deg. C. (131 deg. Fahr.). In paper and board mills, such temperatures are reached during the summer months. It is a usual occurrence in these mills to hear that felts wear out more quickly and that slime forms more profusely during this time. From the bacteriological viewpoint, there are more bacteria per cubic centimeter in the raw water during the summer, but only as a result of the bacteria growing more rapidly at the higher temperatures. The effect of increased temperature on bacterial count is realized in all bacterial tests, since incubation is taken at a temperature of 20 deg. C. (60 deg. Fahr.), as well as at a temperature of 37 deg. C. (98.5 deg. Fahr.).

It is believed that the source of food for bacteria may be the so called cementing substance which holds the fiber elements of wool together. In discussing the disintegration of woolen bathing suits used in the tropics, (and there is an analogy between them and paper machine felts), Burgess (8) may easily be describing the disintegration of wool paper machine felts. "It seems feasible to assume, therefore, that the organisms first develop at the expense of the small amount of food material in the water-film surrounding the fibers, and subsequently cause a retting (rotting) of the fibers through the agency of the enzymes which they secret. Fiber breakdown is initiated by a loosening of the epithelial scales, this being followed (1) on the part of the fiber by the assumption of a striated appearance and increased opacity. The scales become detached, either fragmentarily, or conjointly, in sheath-like masses, and eventually the fusiform cortical cells separate, the fiber becoming thinner in the process."

A rough approximation of bacterial disintegration may be made by carefully stretching groups of fibers to the breaking point by hand, but microscopic examination is required to give more accurate results. Such an examination, when recorded in a series of photomicrographic prints should present conclusive evidence.

A felt which had been removed after five days in use on a board machine making chipboard was so very rotten that it could be pulled apart by hand. The temperature of the shower water was in the neighborhood of 91 deg. Fahr. and the furnish was the usual chipboard one. The pH of the felt shower water was 7.4. Figure 3, which is a typical photomicrographic print of the fibers from this felt, clearly shows the disintegration. The fiber walls are thickened and the decomposition of the epithelial scales is noticeable. In Figure 4, which is a higher magnification of the same sample, the cortical cells are separating into individual units.

The wool fibers of the felt in use on the paper machine are either weakened by physical means and offer the maximum opportunity for bacterial disintegration, or the bacterial attack weakens the fibers and they split.



In either case, the machine tender eventually finds a hole in the felt on the machine.

Figures 5 and 6 were made from a felt which had been in use six days. The same blackening of the fiber wall is present, and, in addition, dirt is shown adhering to the walls of the fiber. Figure 6, which is a higher magnification of the wool from the same felt, shows disintegration similar to Figure 4.

Figure 7 is a print of the deposit from the stretch roll. A careful examination of this picture will disclose epithelial scale residue, cortical cells, wool fibers, and wood fibers as well.

Laboratory tests were made to demonstrate that physical stress was not alone responsible for the disintegration of felts, but that undoubtedly bacterial attack also influenced the results. A new felt, of which Figures 1 and 2 are typical, was soaked in distilled water, pH 6.5, for four days. Figure 8 is a photomicrographic print of the wool fiber. There is a slight thickening of the fiber but this is to be expected from the absorption of the water by the fibers. There is no indication of decomposition. According to Astbury, (2) the absorbed water of wet fibers does not penetrate the interior of the crystals themselves, but lies between them and is distributed over their surface.

Figures 9 and 10 are photomicrographic prints of the same felt soaked in river water for four days. The pH of the water was 6.8 and the sample was allowed to stand at room temperature which was in the neighborhood of 75 deg. Fahr. There is marked evidence of decomposition in one fiber which shows partial destruction of the fiber wall. In use, the weakened fiber would probably split at this point.

Figures 11 and 12 are prints of part of the same felt soaked in a sample of vat overflow for three days. The pH was 7.4. Figures 13 and 14 are prints of the felt soaked in thickened stock for the same length of time. Comparing Figure 1 and Figure 14, each of which is a photomicrographic print of higher magnification of wool fiber, the disintegration which has taken place in the fiber soaked in thickened stock is easily identified.

Although moisture promotes bacterial growth, obviously water is an inherent part of the papermaking process. Also, with the inauguration of closed white water systems, the temperature of felt shower water is bound to increase until summer temperature of the water exists throughout the year. The answer seems to be in eliminating the bacteria as much as possible. According to Burgess (9), treatment of the wool before the manufacture of the felts is not entirely satisfactory, since in the processes which have been tried, the water absorbing power of the wool is modified.

There probably have been several practical demonstrations (10) of the fact that treating the felt shower water has increased the useful life of felts. In the two mills where the above pictures were made, (11) there was an increase in felt life of approximately 15 per cent after treatment of the felt shower water. Although the conclusion can be drawn from the above that bacteria and warm water do cause decomposition of wool fibers, much work remains to be done in determining the best method for overcoming such disintegration, thereby eliminating one source of worn spots, or even holes, in paper machine felts.

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# Carbon Dioxide Recorders in Paper Mills


**W. F. Schaphorst, M.E.**


IT HAS been my experience that when such a thing as a $CO_2$ recorder is mentioned to many boiler operators in paper mills they immediately take on a confused air because they don't know what $CO_2$ means, and feel that they are wading in beyond their depth in attempting to converse on this "mysterious" subject. This $CO_2$ business belongs to the realm of chemistry and not in plant operation according to the notions of the average boiler man.

However, there is nothing really complex about a $CO_2$ machine. The boiler operator or fireman doesn't necessarily have to know anything about chemistry, even though combustion is a chemical process. He needn't even know what the chemical symbol $CO_2$ means.

Continuous records are now made by reliable machines that work automatically as long as they are in working trim. To keep the machine in order is not a problem of chemistry, but one of mechanics, or perhaps some boiler operator would prefer to call it "engineering" in which case the engineer will fit into the job very well. Many engineers and firemen—thousands of them—are daily attending to their $CO_2$ machines and recorders and are doing their work perfectly. Yet they don't know any more about chemistry than any other average man who has never studied that subject.

Should you install a $CO_2$ recorder in your plant you will find it a good plan to instruct several men in its care, if there are "several men." There is no reason why the engineer or fireman alone should be able to care for it. In fact, it is better to assign the duty of keeping the analyzing machine going to a subordinate and make it his regular job. Should the chief endeavor to take care of all such details himself he will certainly overlook them on days when he considers other work more important.

# Developments in the Bleaching of Pulp

FRANCIS J. CIRVES, Chemical Engineer

IN THE matter of bleaching pulp and fibrous substances for the production of paper and other purposes, a continuous search has been made for new and increased uses of chlorine, particularly (a) as to the simplification of the methods of application of chlorine, (b) the enhancing of the fiber strengths and properties for stronger and better products, (c) the increasing of the bleaching action as to whiteness of product, and (d) the increased efficiency and economy in obtaining the desirable qualities.

### Review of the Technical and Patent Literature

Although British Patents existed prior to 1800 for the preparation of bleaching solution by passing gaseous chlorine into a well agitated mixture of lime and water, it was first in 1864 that a Letters Patent for "Improvements in Bleaching Fibrous Substances" was granted to Harold Potter (25). His method proposed bleaching by means of "the action of chlorine gas which was generated by pouring sulphuric acid in a mixture of manganese and common salt in a lead still" and subjecting jute and "shew" of flax, soaked with alkali, and hung on rails in a closed chamber. In 1872, a U. S. Patent was granted to E. Lamm (20) for dissolving bleaching powder in warm or cold water for the purpose of obtaining a bleaching solution. In 1880, a patent was granted to Ernest Solvay (28) for the preparation of bleaching powder by the gaseous chlorination of lime fragments. In 1890, a patent was granted to C. Ramsey (26) for the bleaching of pulp by means of hypochlorite solution. The practical utilization of chlorine necessitated its preparation and shipment on a commercial basis, and so in 1893, patents were granted to E. Cutten (10) and to R. Knietsch (17, 18) for the preparation and packaging of liquid chlorine. In many instances, however, it was still prepared at the point of use, the generated gases being passed into specially constructed bleaching chambers. Ores, pulps, and liquids were treated in this manner.

The Fletcher bleacher was patented in 1923 (15). The first patent on the use of chlorine in the liquid phase was obtained by J. H. MacMahon in 1922 (21). The cooling effect of liquid chlorine was utilized by conducting the liquid indirectly into the bleach preparation tank by means of a helical coil. The gas passed into the circulating lime water at the bottom of the tank to produce the calcium hypochlorite bleaching solution. The formation of the hypochlorite is an exothermic reaction, the heat evolved being utilized for the generation of the gas within the helical expansion coil. The cooling effect of the vaporizing chlorine maintained a temperature below 40 deg. C., above which decomposition and chlorate formation occur. In 1926, MacMahon assigned a patent to the Mathieson Alkali Works (22) in which the expansion pipe was discarded for the pump line into which the liquid chlorine was injected as the milk of lime suspension was circulated into the bleach tank. The inventor specifies that the chlorine "is vaporized to a greater or less extent, some chlorine being directly admixed and combined with the solution without undergoing immediate evaporation." This is the first reference to the use of chlorine in the liquid state for any practical purpose. F. McCombs obtained a patent in 1923 (24) for bleaching pulp with an effluent solution prepared by means of chlorine and water with fragmental limestone and followed by a second stage of hypochlorite. Hypochlorous acid was produced by the interaction of limestone and chlorine water.

The following excerpt from an article published in 1923 entitled "Bleaching Pulp with Liquid Chlorine" (3) discloses a very practical method now generally used for injecting chlorine gas entrained with water into pulp.

> "There are several ways in which liquid chlorine can be used for the bleaching of paper pulp. The cheapest seems to be a process, a German Patent No. 283,006, in which the pulp is treated in the hollander with a spray of water which entrains the chlorine gas with it and thus introduces it into the pulp. After the action of the chlorine is completed, the pulp which is still yellow to a chocolate brown, is washed with a solution of caustic soda. The product is finally treated with a solution of bleaching powder at a temperature of 95 deg. C. The great disadvantage in the use of liquid chlorine for the bleaching of pulp is the tendency for the gas to cause the formation of oxycellulose."

The article describes the use of chlorine gas and not liquid chlorine as the title suggests. However, liquid chlorine is often referred to as the source of supply rather than as to its state of use. Technically, this is a misnomer.

Marsden (23), Donk (14) and Broderick (2) describe the action of chlorine gas on textiles, washed goods, and fibrous materials respectively, using dilute alkaline solutions and using 1-2 per cent chlorine and much less. Bradley (1) describes the use of chlorine in a special cylinder in which pulp is circulated and sprayed in the presence of the gas. These methods employ closed cylinders to prevent the escape of any of the gas into the air. Pressure and partial vacuums are also employed to accelerate the bleaching action.

D. B. Davies (11) treats pulp in a preliminary stage by passing chlorine as a liquid into the neutral pulp with an agitating spinner. The rapidity of reaction combined with the refrigerating effect of the expanding chlorine has advantageous results upon the pulp fibers. A specially designed cylinder protected against the corrosive effects of the wet chlorine is used. An exit vent safely conducts away any escaping gas. A second stage of hypochlorite is necessary to produce a white bleached pulp. The first chlorination stage consumes 30-50 per cent of the bleach and the hypochlorite stage consumes 50-70 per cent.

Devains describes (12, 13) the addition of 50 per

cent of lime water to neutralize the effect of gaseous chlorination of a neutral pulp. The pulp is subjected to the action of the gas in a sealed chamber under pressure. J. D. Rue (27) bleaches pulp by introducing 25-100 per cent excess chlorine of that required for saturation, and subsequently adds lime to form the hypochlorite which completes the operation in one stage. The system requires the chlorinator, the retention tower, and the hypochlorite bleaching equipment.

O. Kress and R. L. Davies (19) have reported the bleaching of kraft by different experimental methods and procedures. In four tests, pulp at 2 per cent consistency was shaken in bottles while chlorine gas was passed into the alkaline suspensions. A period of three hours was required for the consumption of 7 per cent by weight of chlorine with 25 per cent of calcium carbonate and 25 per cent of sodium carbonate. The same time was required to chlorinate without alkalis. One-half hour was required with 10 per cent caustic solution. All of the chlorinated stages were followed by a hypochlorite bleach which required an additional 26 hours at low consistency and five hours at high consistency to effect a total of 9-1/3 per cent chlorine consumption. No advantages were claimed for the alkaline or the non-alkaline solutions.

### The Alkali-Liquid Chlorine Bleach Process

In 1932, a U. S. Patent application was filed by F. J. Cirves (5) based upon certain preliminary work of bleaching in the beater with liquid chlorine (6). Passing chlorine gas adjacent to the beater roll probably has often been tried without accomplishing any bleaching action. Even when the furnish is alkalized, the agitation and retention period is not sufficient to produce a bleach. Chlorine water has been tried in open vessels with very obnoxious results. Besides lowering the consistency and reducing the capacity, the time of bleaching is prohibitively increased. Chlorine may, however, be put into the beater by injecting it in the liquid phase under the beater roll with certain precautions, (a) closing the fore and after part of the beater roll compartment; (b) using a properly designed injection apparatus; (c) alkalizing the beater furnish. Any amount of chlorine may be introduced very rapidly in this manner. Some of the larger and more efficiently designed beaters are constructed with closed roll compartments for the purposes of augmenting the flow of the stock. Such beaters are already adaptable to the process.

Fifteen per cent chlorine was introduced into a small beater in 15 minutes with hydrated lime, 10 minutes with soda ash, and 3 minutes with caustic soda. Higher quantities are possible but are not frequently employed. The effects of air contamination and corrosion are nil since the alkaline condition is maintained during the injection period.

### Theory of Alkali-Liquid Chlorine Bleaching

Inasmuch as even the slightest amount of chlorine gas will escape from a beater of pulp, due to its buoyancy, it is essential that no gas be generated at any time. There should be sufficient back pressure at the injection aperture so as not to permit natural expansion to volatilize the liquid beforehand. It is also necessary that any fibers drawn into the injection line due to a partial vacuum from the previous operation can be blown out in the next operation. No harmful effects of local over-chlorination of the pulp are produced due to the effect of refrigeration and rapid dispersion. Ice is formed at the point of injection in sufficient quantities to solidly freeze the injector to the beater floor.

The refrigeration is entirely due to the expansion of the chlorine liquid and not of the gas. Doubtless the chlorine hydrate, $Cl_2.8H_2O$, is formed; however, the compound cannot exist but momentarily, due to its reaction with the alkali present.

A further analysis of what takes place when the liquid is injected into an alkaline furnish indicates that some direct chlorination of the pulp occurs and that less hydrate of lime is consumed to maintain a complete alkaline bleach than in the hypochlorite bleach process. The amount of such direct chlorination accomplished may be calculated with the presentation of certain other facts. It is generally recognized that as a hypochlorite bleach proceeds, an acid condition is developed to the extent that at the end of a semi-bleach the pH may be 6.0 and for a high bleach it may be as low as 3.0 and 4.0 pH. This will vary with pulps and parenthetically it is stated here as being also considerably influenced by the

**Figure 1**
Test—
U. S. Forest Products
Laboratory, Madison, Wis.

metallo-compounds dispersed within the fibers and playing the role of a buffer during bleaching. The variation of the ash contents of pulps of different species; i. e., spruce and tamarack, for the same reason presents difficulties in sizing with rosin and alum in the beater.

It has been found that in order to maintain a completely alkaline condition throughout bleaching by means of hypochlorite that 50 per cent of the weight of the chlorine represented is required as hydrate of lime (7). The same rule applies in the direct chlorination of pulps as was found by Devains (13) and others (4). Also in the preparation of hypochlorite solution, 50 per cent of the chlorine is lost as calcium chloride, the neutralization product of lime and the acid developed. It is obvious, then that the chlorine efficiencies of direct chlorination and of hypochlorite bleaching are 50 per cent and 25 per cent respectively as to the actual available chlorine. The actual efficiency of the chlorine thus consumed by the pulp fibers is another matter. It is generally conceded, however, as being much less in that of hypochlorite bleaching.

Since the theoretical combining ratio of hydrate of lime to chlorine is 1.04, the lime neutralized in direct chlorination is 0.52 and the total lime consumption for hypochlorite preparation and bleaching is 1.56. A 100 per cent chlorination of pulp, therefore, would result in a lime consumption ratio saving of 1.04. The saving of lime incurred in an alkali-liquid chlorine bleach was determined at 0.12, which thereby corresponds to a 11.6 per cent direct chlorination of the pulp. The remaining 88.4 per cent bleaching is accomplishd by the hypochlorite formed *in situ*.

It may be necessary to state that ordinarily in chlorination of pulp, it is advisable to remove the lignin chloride decomposition products by an alkaline wash before bleaching to a white with hypochlorite. This will prevent the rebleaching of the waste products. The advantages of the selective action of hypochlorite on the cellulose lignin under alkaline conditions is being more generally recognized (8). It is, therefore, apparent that at alkaline pH levels of reaction the rebleaching of the decomposition products is greatly reduced if not avoided.

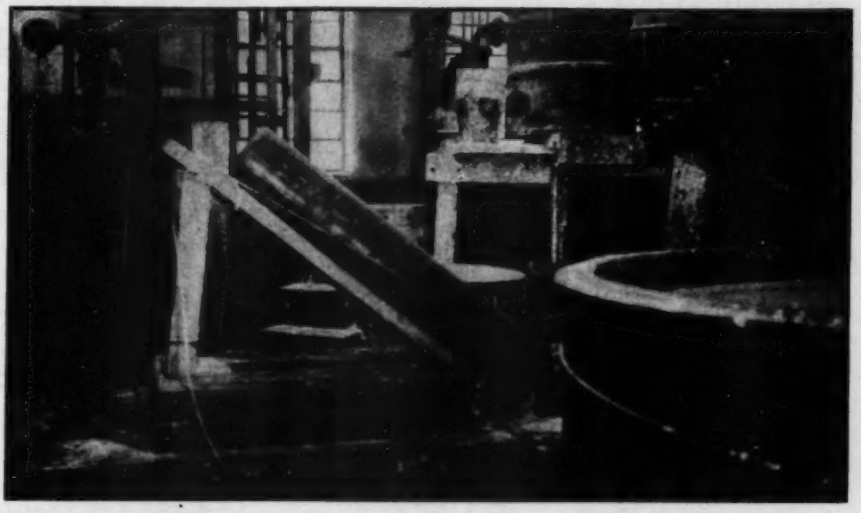

**Figure 2**
**Demonstration—**
**Wausau Paper Mills Company**
**Brokaw, Wis.**

## Data and Discussion of Results

Figures 1 and 2 illustrate the temporary and experimental methods employed for the injection of the liquid by inverting the cylinders of chlorine. Figure 1 shows the use of a 100-lb. cylinder in conjunction with a 50-lb. pulp capacity beater of concrete construction and equipped with a bronze beating tackle (9). Figure 2 shows a 150-lb. cylinder similarly inverted and placed on a scale for weighing purposes. The paper-mill beater has a 1500-lb. pulp capacity, is of wood construction, and is equipped with an iron beater tackle. A similar injection was also originally made in a 1100-lb. stone roll paper-mill beater (6).

In the compiled Table of Bleach Summaries, data 1-A is a comparison of a liquid chlorine bleach with a hypochlorite as performed according as is shown in Figure 1. The unbleached pulp data are included in 4-A, the stock of which consisted of Southern pine kraft being somewhat molded due to six years storage. The beater charge was 40 lbs. of pulp. The bleached pulp sheets obtained are practically identical in hue and whiteness. The color determinations were made on an Ives color analyzer (9). Eighty-five per cent color values are considered good criterions for a high white sheet especially for the blue. The chlorine consumption reduction is 16 per cent and the pulp strength tests are better without exception with a very high increase in tear. On a pulp rating basis $\left(\frac{\frac{1}{2}\text{ Burst}+\text{Tear}}{2}=\text{Beater Value}\right)$ (16), the pulp strength increase is 12.5 per cent. The liquid chlorine bleach results are thus shown to be superior in every instance.

In data 2-A, a comparison is had of bleaching with the same chlorine consumption at 14 per cent. The Ives readings are 5 per cent higher for each color and the pulp strength tests are considered equal or better, the pulp rating and the folding endurance being a trifle higher. Although the freenesses for 1-hour ball milling are 230 and 255, the 80-minute ball milling freenesses are 170 and 145 respectively in favor of the injection. The time required to inject 5.6 lb. of chlorine was 15 minutes. The total bleaching time for each was

5¼ hours, single stage, and the temperature elevations are shown in contrast.

In data 3-A are shown the bleaching effects obtained with the use of soda ash and caustic soda instead of hydrate of lime. Although the amounts of chlorine bleaching are not directly comparable, the use of these alkalis are feasible and advantageous. The bleaches were maintained alkaline, positive to phenolphthalein during the entire bleaching period. The burst, tear, fold and freeness tests are remarkably high, and the Ives color readings are exceptional. The injection periods were reduced to ten minutes and three minutes respectively. All the bleached pulps of 1, 2 and 3-A, produced an excellent quality of sheet over the fourdrinier.

Data 5-B indicates the effects of a liquid chlorine bleach on Swedish kraft. B has reference to Figure 2 with the use of paper-mill beater. The charge used was 1000 lb. of pulp. The burst and fold are better than for the unbleached pulp. Since no hypochlorite bleach data is available, the proper comparison cannot be made. Seventy-five pounds of chlorine was injected in 35 minutes. The minimum injection period was not possible with the injection apparatus employed. The total bleaching time with a small amount of steam used was two hours. A full steam injection has reduced the time in half the same as in hypochlorite bleaching.

In data 6-B, a comparison is made with the performance of a Fletcher high density bleacher on a sulphite hemlock stock, the unbleached data of which is also included. Bleaching at 12 per cent density reduces the time and chlorine consumption. The pulp strength tests are still in favor of the injection process performed at 4.7 per cent consistency even with over twice the bleaching time. Some steam was used. Further allowance must also be made because the beater bleach pulp samples were not obtained until 48 hours after dumping in the stock chest at the final beater temperature of 100 deg. Fahr.

## Conclusions

The alkali-liquid chlorine bleach process is not limited to only beater bleaching. The claims of the process define its use within a restricted space, including a bleacher and bellmer. As has been indicated, no special design of equipment is required and ordinary agitation with watery consistencies will suffice. The process includes three operations performed simultaneously: (a) chlorinating, (b) hypochlorite bleach preparation and (c) hypochlorite bleaching. Any alkali used to form bleaching solution can be utilized, including calcium carbonate, which forms the hypochlorous acid. Mixtures of alkalis are used to obtain desirable effects and with pH control.

A battery of beaters are equipped for the process by conducting lead-lined iron pipe branch lines to the main line and to the central chlorine tank. The injectors are placed under the beater roll, or near the circulating impeller in the case of a bleacher. The prescribed amount of chlorine is injected by weight, controlled by a Hastelloy valve placed beside the beater, the chlorine tank being set on scales which may be read directly or attached to an electrical signal. A second method is to put the prescribed amount of alkali into the beater furnish and introduce the proper amount of chlorine by observing the phenolphthalein or other indicator end point. The third and simplest method is to inject the liquid chlorine by an interval time clock, the time being forecast by the chlorine pressure.

The use of liquid chlorine has become no hazard with the equipment and safety regulations imposed upon it. Mills have learned to handle it without difficulty. It would not be much to predict that the injection of liquid chlorine into an alkaline furnish of pulp will find its use wherever one or more stages of hypochlorite bleaching is performed.

**TABLE OF BLEACH SUMMARIES**

| Data | Bleach | Per Cent Cl. | Lb. Cl. | Lb. Alk. | Alk. Ratio | Max. Burst | Tear | Pulp Rating | Tensile | St'ch | S.R. Free | Max. Fold | Ives Color | | | Per Cent Con. | Temperature | | | Bleach Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Red | Green | Blue | | In. | Final | Rise | |
| 1-A | Liq. Chlorine.. | 10.5 | 4.2 | Lime 7.7 | 1.8 | .80 | 1.02 | .63 | 5385 | 3.7 | 325 | 350 | 80 | 76 | 67 | 4.2 | 18 | 36 | 18°C | 4¼ |
| | Hypochlorite.. | 12.5 | .... | ..... | ..... | .76 | .80 | .56 | 5100 | 3.4 | 320 | 215 | 80 | 74 | 67 | 4.2 | 23 | 41 | 18 | 4¼ |
| 2-A | Liq. Chlorine.. | 14 | 5.6 | Lime 8.5 | 1.52 | .72 | .66 | .53 | 5990 | 4.3 | 230 | 220 | 85 | 82 | 76 | 4.1 | 18 | 35 | 17 | 5¼ |
| | Hypochlorite.. | 14 | .... | ..... | ..... | .70 | .70 | .52 | 5405 | 3.0 | 255 | 130 | 81 | 77 | 71 | 4.1 | 25 | 46 | 21 | 5¼ |
| 3-A | Liq. Chlorine.. | 11 | 4.4 | S. Ash 14.5 | 3.3 | .88 | 1.54 | .83 | 5035 | 6.5 | 540 | 640 | 85 | 82 | 76 | 4.2 | 18 | 38 | 20 | 4¼ |
| | Hypochlorite.. | 15 | 6.0 | NaOH 10.5 | 1.75 | .79 | 1.63 | .79 | 4970 | 4.5 | 500 | 210 | 82 | 75 | 66 | 4.1 | 24 | 49 | 25 | 3 |
| 4-A | Unbleached... | Southern Pine Kraft | | | | .97 | 2.2 | .96 | 3165 | 8.8 | 815 | 1060 | 49 | 34 | 27 | ..... | ..... | ..... | ..... | ..... |
| 5-B | Liq. Chlorine.. | 7 | 75 | Lime 100 | 1.34 | 1.52 | .59 | .68 | ..... | ..... | ..... | 3700 | 73 | 66 | 53 | 4.6 | 60 | 100 | 40°F | 2 |
| | Unbleached... | Sw. Ostrand #50 Kraft | | | | 1.50 | .86 | .81 | ..... | ..... | ..... | 1460 | 60 | 44 | 37 | ..... | ..... | ..... | ..... | ..... |
| 6-B | Liq. Chlorine.. | 8 | 80 | Lime 115 | 1.44 | .89 | .67 | .56 | ..... | ..... | ..... | 192 | 83 | 79 | 76 | 4.7 | 70 | 100 | 30 | 4½ |
| | Hypochlorite.. | 7.5 | Fletcher | | | .84 | .53 | .48 | ..... | ..... | ..... | 280 | 84 | 82 | 78 | 12 | 70 | 85 | 15 | 2 |
| | Unbleached... | Sulphite Hemlock | | | | .90 | .34 | .40 | ..... | ..... | ..... | 270 | 65 | 57 | 55 | ..... | ..... | ..... | ..... | ..... |

## Summary

(1). In alkali-liquid chlorine bleaching the expenditure, upkeep, and control of a hypochlorite bleach plant is unnecessary.

(2). The combined operation of bleach preparation, and bleaching is most economically performed in a paper-mill beater and bleacher.

(3). The injection of liquid chlorine into an alkalized furnish permits beating, bleaching, coloring, and sizing according to beater schedule.

(4). The bleaching control is absolutely simple and uniform, requiring only the operation of a small chlorine valve at the side of the beater.

(5). There are no contaminating or corrosive effects caused by the alkali-liquid chlorine bleach process.

## Acknowledgment

The author acknowledges with greatest appreciation the assistance of those through whom the development work embodied in this treatise was made possible:

The personnel of the Section of Pulp and Paper, U. S. Forest Products Laboratory, Madison, Wisconsin, Dr. C. E. Curran, In Charge; C. K. Baird, Senior Chemist; and F. A. Simmonds, Associate Chemist; with whose directive efforts the work and proofs of the process was firmly established.

W. B. Clemments, General Manager, and W. J. Garding, Chemist of the Wausau Paper Mills Company, Brokaw, Wisconsin, with whose aid and paper mill equipment, tests were made in the furtherance of the bleach process in a practical way.

The Mathieson Alkali Works, Inc., New York, represented by W. J. Savell, Technical Adviser, Sales Department, by whom the chlorine requirements were supplied for the bleaching demonstration at Brokaw.

All others, though not particularly mentioned, who aided in the compilement of the work and of the publication represented.

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# American Flax for Yarns and Papers

EXPERIMENTAL STUDIES in Flax Growing, Decorticating, Chemical Degumming, and Manufacture into Yarns and Papers are reported by a committee appointed by the Textile Foundation to supervise the studies, in a pamphlet issued by the Foundation.

Flax was grown in southern localities of the United States under the supervision of Lyster H. Dewey, Department of Agriculture. Decorticating, chemical degumming, water retting, and spinning into yarn were studied under the supervision of H. H. Willis at Clemson Textile School. Miss H. U. Kiely and Warren E. Emley supervised papermaking tests at the American Writing Paper Company and National Bureau of Standards, respectively.

The yields of straw were found to be too low and the cost of separating the fiber too high for profitable commercial operations. However, it is stated that different localities might give better yields of straw. Also, that future improvements in mechanical methods of decorticating and in chemical methods of degumming may enable 100 per cent flax to be run on cotton and woolen equipment profitably.

The possible use of American flax in the paper industry is discussed, in part, as follows:

The paper industry prefers to use the waste from the textile industry, to the practical exclusion of raw fiber, whether linen or cotton. Garment clippings or rags are better adapted to the papermaking processes; raw fibers are too apt to become tangled during the preliminary cooking and beating. Moreover, textile wastes are always cheaper than raw fibers. The best grade of cotton rags (new white shirt cuttings) usually sells for two or three cents a pound less than raw cotton. The paper industry has, therefore, practically no experience in the use of raw fiber, and little incentive to develop such experience.

The domestic production of cigarette paper, while offering an attractive field, seems dependent for its development upon the successful establishment of a domestic linen industry, for it seems unlikely that domestic raw fiber can compete with linen cuttings.

Five samples of American flax processed in different ways were made into experimental papers. Three of these were made by the National Bureau of Standards and two by the American Writing Paper Company. In every case, the fiber was found to be of good quality but not sufficiently free from dirt, shive, and woody material. When treated mildly, the dirt carried through into the paper, making the sheet unsalable. When treated with sufficient severity to remove the dirt, the strength of the fiber was seriously impaired. It seems likely that most of this dirt would have been removed mechanically if the fibers had been put through the regular textile processes, which is another reason why the paper manufacturer is likely to prefer his flax in the form of linen cuttings.

A cleaning process more effective than any tried in these experiments will have to be developed to produce a fiber satisfactory for papermaking.

# Paper Sketches ---

## MARCHANT WARRELL

OPERATOR OF THE WORLD'S FIRST PRACTICAL CONTINUOUS PAPER-MAKING MACHINE, INSTALLED IN 1804, AT A MILL IN HERTFORDSHIRE, ENGLAND. ALTHOUGH RIOTING WORKMEN FEARED THIS NEW FORM OF COMPETITION AND TRIED TO BURN DOWN THE MILL, WARRELL CONTINUED TO OPERATE THE MACHINE, CONFIDENT THAT THE GREATER PRODUCTION WOULD HELP, INSTEAD OF HINDER, THE WORKING MAN'S CAUSE.

SO URGENTLY NEEDED WAS PAPER IN THE SOUTH DURING CIVIL WAR DAYS, THAT ONE CONFEDERATE PAPER MILL PAID 575% DIVIDENDS ON ITS INVESTMENT DURING THE YEARS 1861 AND 1862.

THE HIDES OF AN ENTIRE FLOCK OF SHEEP ARE SAID TO HAVE BEEN REQUIRED TO SUPPLY MEDIAEVAL ENGLISH LANDHOLDERS WITH A STRIP OF PARCHMENT SUFFICIENTLY LARGE TO DEED AWAY A SINGLE ACRE OF LAND.

1,933,643 TONS OF WOOD-PULP AND OTHER PULP, VALUED AT $70,760,921, AND 2,475,088 TONS OF PAPER AND MANUFACTURES, VALUED AT $93,009,855 WERE IMPORTED INTO THE UNITED STATES DURING 1935.

# Experimental Wood Grinder Studies at Darmstadt[1]

Translated and Condensed by
**Melburn Heinig**
Junior Chemist,
Forest Products Laboratory

**ABSTRACT**

*W. Brecht[2] describes the new experimental grinder at the Institute of Paper Making at Darmstadt and discusses experiments on variables of grinding. Emphasis is given to two factors not commonly considered, the grinding number and the quality-cost. The first, a sort of friction coefficient, comes from the well known grinder power equation;[3] the second is the ratio of the power consumption per unit of production to the breaking length. The effects of pressure, speed and grinding zone area were studied at low temperature and consistence. The effect of the angle of grinding was studied. The effect of temperature was investigated at constant and varying consistence.*

THE grinder is a simple form of pocket grinder of J. M. Voith in Heidenheim. The 33 kw. d-c. motor gives peripheral speeds from 0 to 3740 ft. per min. to the stone which is 23.6 inches in diameter and 5.9 inches in width. The grinder can be operated with one or two pockets (Figures 1 and 2). When run with one pocket, five sizes of continuous grinding zone length can be obtained by varying the size of stone surface. The operation with two pockets is achieved by inserting a replaceable partition and by the presence of a second pressing device. Grinding pressure is obtained with weights and a gear wheel and rack. When the pocket is emptied by grinding, a hydraulic control cylinder (not visible in the figure) which is set up over the grinder, moves the pressure plate to the starting position. In order to achieve an accurately known grinding pressure, carefully cut wood cubes were used and the pressure was measured by a hydraulic pressure chamber built in between the pressure plate and the wood pile (Figure 3).

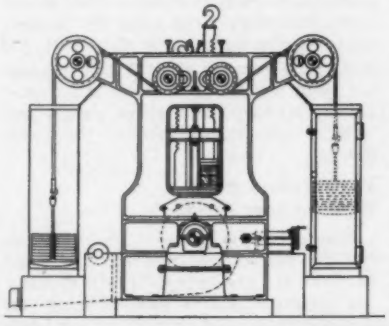


**Fig. 1—Drawing of experimental grinder**

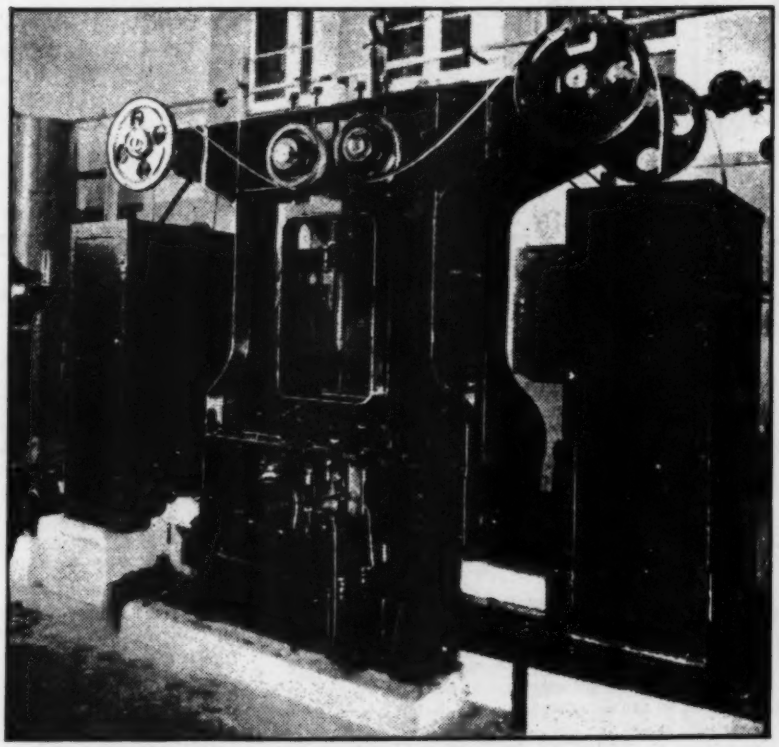


**Fig. 2—View of experimental grinder**

The pressure chamber consists of a steel cylinder and piston with a leather collar on the lower end. The force of the pressure plate is applied to the top of the piston over a spherical surface to give a true measurement of the pressure at the wall of the chamber. Glycerine transmits the pressure to a manometer. Different manometers can be used to cover wide ranges of pocket pressure.

The pulp is first diluted, then passed over a flat sliver trap and delivered to a two-stage screening operation. The coarse material from the second stage is taken for a weight determination. The screened pulp goes to a dewatering machine. The waste water can be used over. Modern apparatus is near at hand for testing the pulp.

The apparatus can handle round wood, billets and cubes of widely different kinds of wood and pretreated by different procedures. The influence of the nature of the stone, pressure, speed, size of grinding surfaces, sharpening procedure, construction variations, etc., can be investigated in both hot and cold grinding.

## Experiments

*(By R. Trenschel and W. Miller)*

*Wood*—Pine of German origin was used.[4] It was cut in the spring, was 60 years old and had a total storage period of half a year. The average trunk diameter was 8 inches. The density was 25 lb. oven dry per cu. ft. of green volume. The average moisture was 19 per cent.

*Stone*—An artificial "Herkules" stone —grit A00.

*Sharpening*—A bevel-edged roll, No. 12 spiral with 1¼ inch lead was used. The width was 1⅝ inches; the diameter, 3⅛ inches. The stone was sharpened before a new run as soon as the speed of the wood feed had decreased measurably in the previous run. In order to obtain a known constant contact pressure, a specially constructed device was used at a pressure of 179 lb. per inch width of roll. The roll was moved across the stone by a motor which rotated the support spindle guiding the sharpener carriage by means of a worm gear and V-belt.

*Cleaning the Stone*—The stone was sprayed on the rising side (Figure 4) with pulp-free water at 14 deg. C. and a pressure of 3.5 atoms. The stone dipped 1.2 inch in the pulp in the trough in which the consistence was maintained at 1 per cent.

*Testing Pulp Properties*—Samples were removed from the trough at intervals of 5 to 10 minutes according to the speed of the wood feed, put together, diluted to .7 per cent dryness, and freed from shreds and splinters on a filter

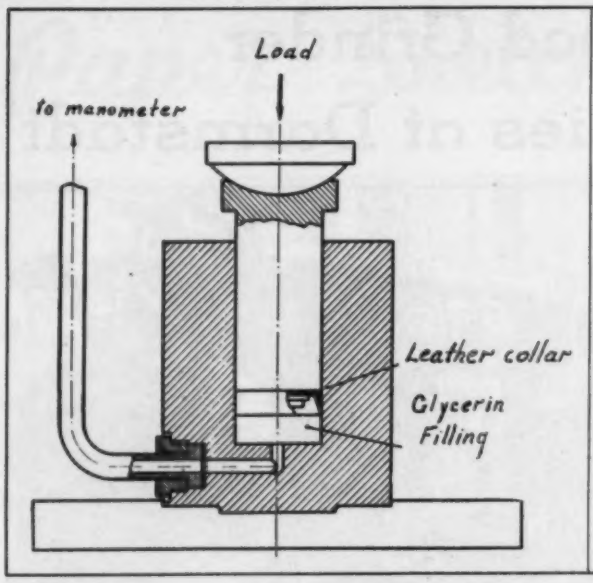



Fig. 3—Hydraulic pressure chamber for measuring the grinding pressure

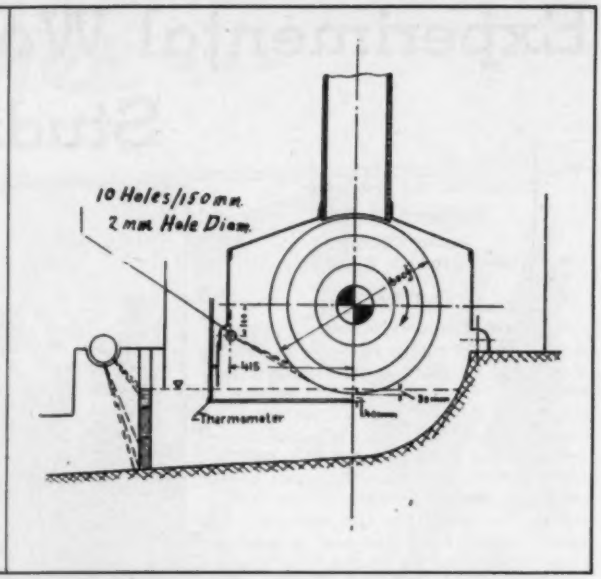



Fig. 4—Method of cleaning the stone in cold grinding experiments

with 5/64-in. holes. The consistence was then determined again and a portion taken for S.R. freeness and another for fines content determination on the Hurum-Kiem tester.[5]

The sample was 4 grams oven dry. Screens No. 65 and No. 120 were used. Seven washings were made. Another portion of suspension was used for sheets on a Strecker[6] machine at a basis weight of 90 grams per sq. m. (64 lb. per ream, 25 by 40 by 500). In the sheet machine a No. 80 top, No. 50 middle and No. 5 lower screen were used. The sheets were 9¾ inches by 13⅝ inches. They were couched with an ivory board using also a wet felt and rubber roll which was rolled back and forth two times on the stack of sheets at a pressure of 67 lb. per inch of roll length. The sheets were dewatered on a plane inclined at 6 deg. to prevent crushing; a roll exerting a pressure of 7 lb. per linear inch was rolled freely over the stack consisting of a cover felt, a felt interply, sheet and ivory board. The sheet was passed through a Rieth linear press at a pressure of 28 lb. per inch by a single passage and dried on a chromium plated copper plate at a constant temperature of 70 deg. C. The sheet with the board was pressed with a linen cloth held under a tension of 1.5 lb. per inch.

## COLD GROUNDWOOD PULP

The cold grinding process has lost practical significance due to the prevalence of hot grinding in commercial practice; nevertheless, it is a basic procedure which should be understood for its own sake and its relation to hot grinding. Only Kirchner has investigated it to any extent and even his results are inconclusive due to his primitive set-up and inadequate pulp testing methods.

### The Influence of Grinding Pressure

As the grinding pressure increases, both the total energy consumption, N (Figure 5) and pure grinding energy, $N_e$ (i.e., N corrected for no-load losses) increase proportionately. The grinding number, Z,[7] may be defined by the equation: $Kw = \frac{FPVZ}{75}$

Kw = power consumed at the wood-stone contact surface

F = effective grinding surface

P = unit pressure of wood against stone

V = peripheral speed of the stone

Only by knowing Z can the energy consumption be calculated from the pressure and speed. It is not a pure friction coefficient but expresses the combined resistance set up by various constituent actions of grinding, and measure the useful work done. Z should not be calculated from the total energy consumption as it includes the irrelevant no-load losses. When calculated from the pure grinding energy, $N_e$, the true grinding number, Z increases with increasing pressure, quickly reaching a constant value.

The production follows the curve, E. As with the grinding number, the energy consumption per unit weight of pulp, $N_{sp}$, when calculated from the total energy consumption, is distorted by the no-load losses; when calculated from the pure grinding energy consumption, $N_e$, it is approximately constant at higher pressures.

The pulp quality, especially strength, decreases with increase of pressure between 11 and 35 lb. per sq. inch (Figure 6). The expression, kw. hr. per 100 kg. oven-dry pulp per 100 m. breaking strength—equivalent to

$$\left(\frac{50.75 \times \text{hp.—days per ton}}{\text{m. breaking length}}\right)$$

assuming a given cost per kw. hr., can be called the "quality cost." This factor increases greatly with grinding pressure. The pulp becomes coarser, the surface roughness greater, the density less, and the porosity greater with increasing pressure.

### The Influence of Peripheral Speed

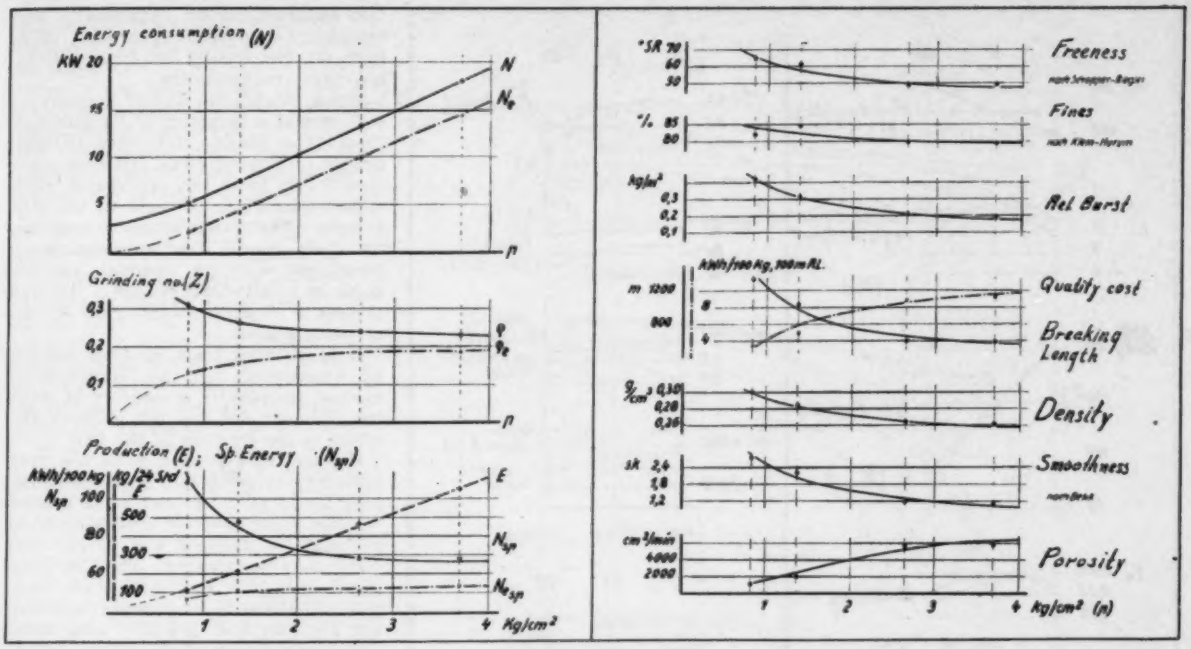
Both speed and pressure were studied under the same conditions. The speed was varied from 1580 to 3640 ft. per min.

The specific energy requirement, $N_e$ decreases with increase of speed to a practically constant value at 2960 ft. per min. (Figure 7). The grinding number, $Z_e$ is the lowest at 2360 to 2960 ft. per min. In the range studied, the increase of speed caused a lose of all-around quality so that the highest quality per unit of cost is obtained at the lower speeds.

### The Influence of Grinding Zone Length

The grinding pressure was held at 19.5 lb. per square inch and the speed at 2950 ft. per min. By interchanging pressure plates and shifting the pocket walls, the length of grinding surface or contact arc was varied while the width remained constant (Figure 8).

As the grinding zone length increased, the specific energy requirement increased considerably, due to the energy consumption increasing faster than production. Although the intensity of contact pressure was constant, the wood feed rate dropped off very noticeably. $Z_e$ increased due to the refining action of the longer surface. The quality cost remains roughly constant, the increase of quality balancing the increase of specific energy requirement. Grinder construction has seemingly developed cor-




**Figs. 5 (left) and 6 (right)—Influence of pressure in cold grinding experiments. Experimental conditions: One pocket, vertically and centrally located; wood blocks 6½ by 4⅝ by 4⅛ inches, ground transversely; stone-wood contact surface 28.7 square inches, contact length 6¾ inches; peripheral speed 2260 f.p.m.; temp. of shower water 58 deg. Fahr.; consistency in pit 1 per cent; conversion factor: 1 kg. per sq. cm. equals 14.2 pounds per square inch.**

rectly in providing not only greater speed and pressure but also grinding surface length.

## COMPARISON OF COLD WITH HOT GRINDING PROCEDURE

The angle between the line of stone movement and the grain of the wood is 90 deg. in transverse, 45 deg. in diagonal, and 0 deg. in longitudinal grinding. All three were tried in the days of cold grinding, but longitudinal and diagonal grinding have disappeared due to the necessary contacting pressure apparatus which was incompatible with the increasing power of grinders and to the well-known high energy requirement associated with those processes. The quality of pulp from longitudinal and diagonal grinding in the cold process is little known and not at all known in the hot process. Results are shown in Figure 9; broken lines refer to cold and solid lines to hot grinding.

Production increases almost linearly with the angle of grinding while the energy consumed per unit weight of pulp decreases.

The tendencies observed in cold grinding differ only slightly from those in hot grinding. The production is only slightly different so that, except for the longitudinally ground pulp, the specific energy requirement of the hot method exceeds that of the cold method. For a given specific energy requirement the pulp strength is lower in the cold method for all grinding angles.

Longitudinally ground pulp is much finer and stronger than that ground transversely. The latter has a more favorable quality-cost due to high produc-

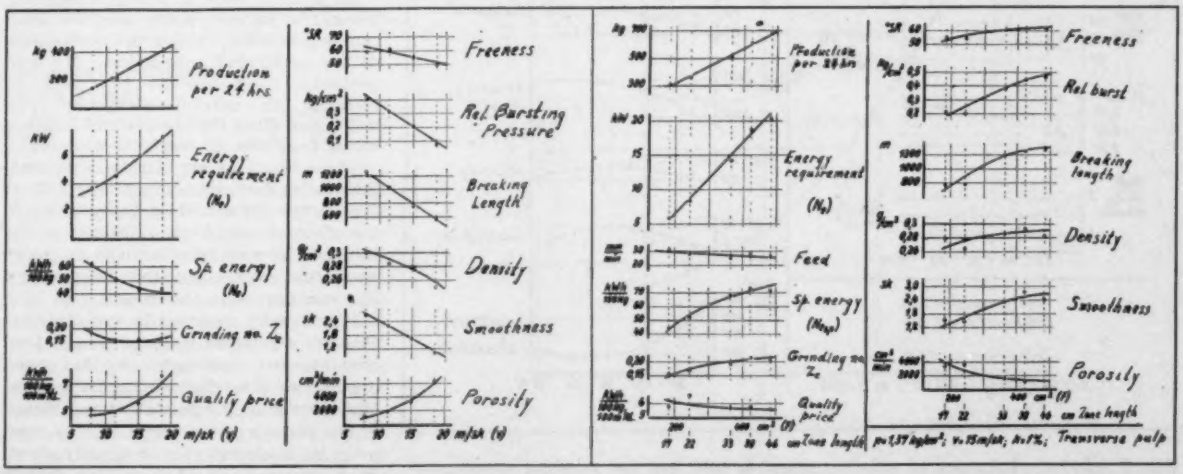



**Fig. 7 (left)—Influence of peripheral speed of the grinder stone in the cold grinding experiments. Experimental conditions: Pressure at wood-stone contact 19.5 pounds per sq. in.; all other conditions as described under Fig. 5 (except peripheral speed); conversion factor: 1 m. per sec. equals 197 f.p.m.**

**Fig. 8 (right)—Influence of length of grinding zone in the cold grinding experiments. Experimental conditions: As in Fig. 5 except the length of the wood blocks depended on the size of grinding area; peripheral speed 2960 f.p.m.; pressure 19.5 pounds per sq. in.; conversion factors: 1 cm. equals 0.394 inch. 1 sq. cm. equals 0.155 sq. in.**

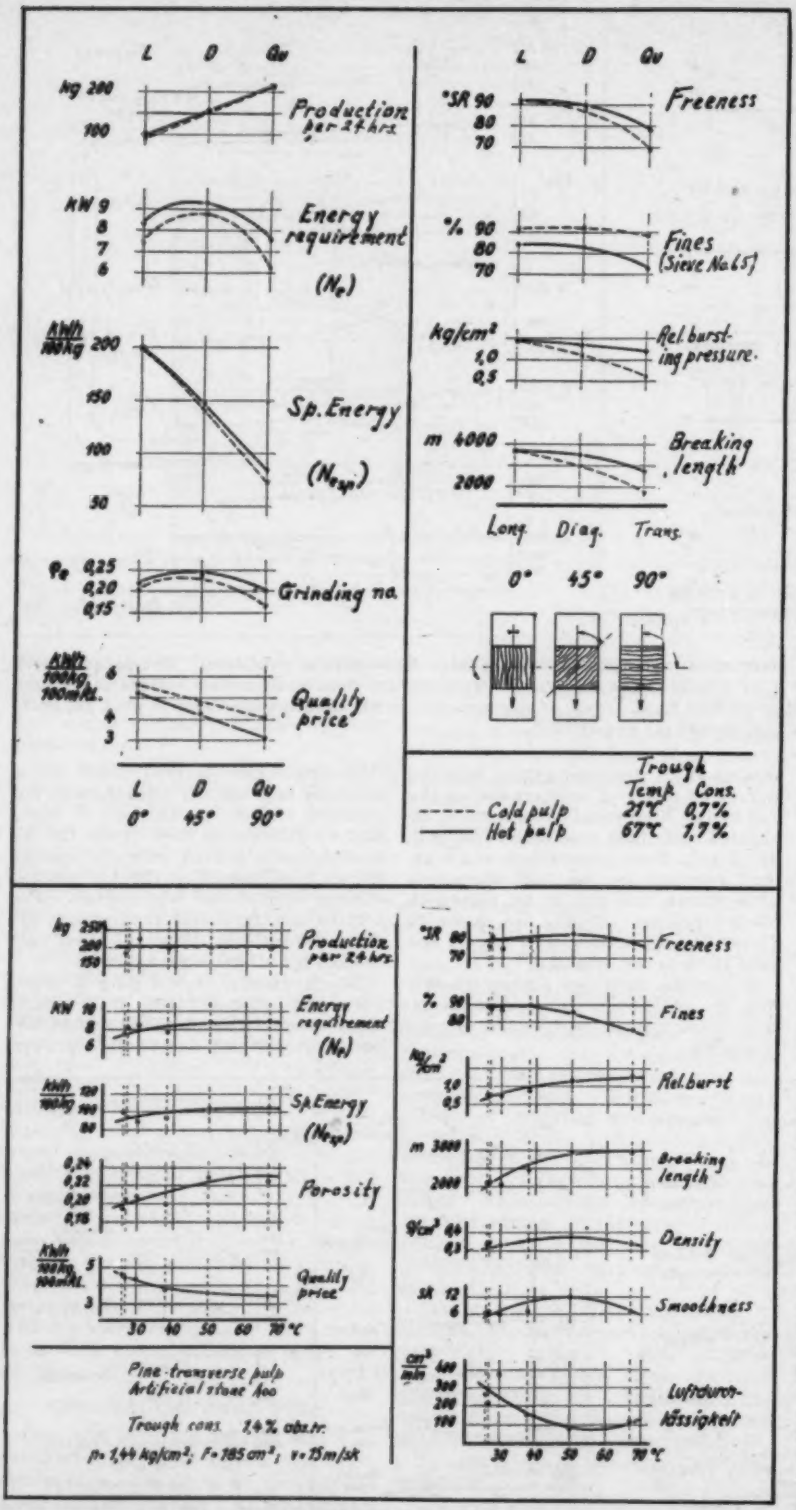



**Fig. 9 (above)—Influence of grinding angle in cold and hot grinding experiments. Experimental conditions: One pocket, vertically and centrally located; pine blocks of differing size depending on the angle and area of grinding.**

**Fig. 10 (below)—Influence of temperature in the grinder pit in the groundwood process. Experimental conditions: One pocket, vertically and centrally located; consistency 1.4 per cent; pressure at stone-wood contact 20.4 pounds per sq. in.; area of grinding zone 28.7 sq. in.; peripheral speed 2960 f.p.m.**

tion and fair quality. Diagonally, and especially longitudinally ground pulps have superior quality but disproportionate energy requirements.

These conclusions apply basically to cold as well as to hot grinding, although there is a definite difference in pulp quality. Increasing the grinding angle from 0 deg. to 90 deg. produces a much greater change in strength in the cold process. The graph shows the superiority of hot ground wood most clearly for transverse, next for diagonal, and not at all for longitudinal grinding. The hot process is superior economically for all grinding angles.

It is striking that the fines content as determined by the Hurum-Klem method, supposedly a measure of quality, is lower for the hot groundwood, which is the stronger of the two.

Hot and cold ground pulps are very different microscopically in all cases, the fiber length of the former being greater —about 9 per cent for longitudinal, 30 per cent for diagonal and 33 per cent for transverse grinding. The fiber fragments of the hot groundwood are made thin and pliant by longitudinal splitting and are finer and "greasier" than those of the cold groundwood.

The higher quality of longitudinal and diagonal groundwood requires so much more energy that, disregarding construction considerations, there is no incentive to depart from the customary transverse grinding. The fact that present day practice uses the hot process exclusively indicates that the transverse grinding requires the lowest energy consumption and the hot grinding leads, not to an energy saving, but to a considerable quality improvement.

The experiments on hot and cold grinding at different angles showed the better quality of the hot pulp. Later work was on the question of what conditions in cold grinding lead to the advantages obtained by changing over to hot grinding.

To go from cold to hot grinding, the amount of shower water used for dilution is decreased, raising the consistence of the outflowing suspension. Its temperature rises because the heat of grinding is carried away by less liquid and since the shower and dilution water from the thickener is warmer.

These relations are simply calculated. From the fact that practically all of the energy furnished to the grinder is transformed into heat, a theory[8] of the heat economy of grinding may be developed for calculating the temperature and consistence in the trough.

It is usually assumed in practice that there is a relation between trough temperature and consistence, so that when one is low the other also must be low. This is true only where the temperature of the shower water which is to be used over is neglected, as is usually done. If the temperature of the return shower water is controlled independently, then the trough consistence and temperature also can be varied independently.

To show how these variations (basically related to the transition from cold to hot grinding) affect the results of the

process, the consistence was held constant in a series of runs and the heat of the suspension varied by changing the shower water temperature. In the following experiments, however, the variation of trough consistence was produced with constant pulp temperature by regulating the quantity and temperature of the dilution water.

### Influence of the Temperature in the Trough

To obviate the possible influence of pulp in the dilution water, pulp-free water was used.

Figure 10 shows that production is practically unaffected, while the energy consumption increases slightly with rising temperature, the specific energy requirement increasing. The increase of $Z_e$ shows that more intensive action is occurring at the higher temperatures. The quality-price decreases sharply, due to the increase of pulp strength being greater than that of specific energy consumption.

The strength and stretch show an increase, while the fines decrease. The density and smoothness are greatest and the air transmission lowest at 122 deg. Fahr. This turning point rises with trough consistence. These results hold only for pulp-free shower water.

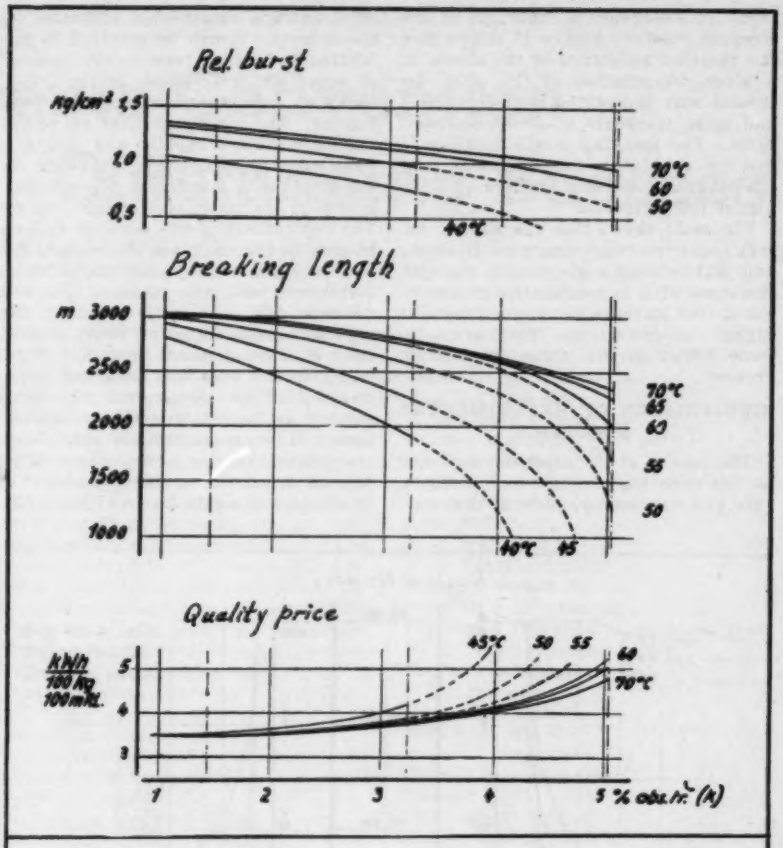
At constant trough consistence the transition from "cold" to typical "hot" pulp, as shown microscopically,[9] is affected by temperature alone. The fiber length increases 11 per cent at 122 deg., 24 per cent at 152 deg. over the length at 78 deg. Fahr.; the increase is shown by equalization of the size of the length groups and the appearance of several longer fractions with rising temperature. The 78-deg. pulp has wide, stiff, splintery particles and many fiber bundles. The 122-deg. pulp begins to show fibrillation, and the 152-deg. pulp has long, strongly fibrillated, broken-open fibers which appear to be pliable due to their curvature. The fines consist of very fine fibrils and differ in that way from that of the "cold" pulp.

### Influence of Consistence in the Trough

The influence of temperature rise was studied at consistences of 1.43, 3.23 and 5.04 per cent.

While the data on the energy economy showed only a small variation in the relation to the pulp concentration, the character of the pulp showed a marked difference. The fines content data were not very satisfactory, and the slowness decreased decidedly with rising temperature below 140 deg. Fahr. At temperatures over 140 deg. Fahr. the slowness differences, for consistences up to 3 per cent, are first small, but at higher concentrations a drop in slowness appears.

The density of the pulp sheets of equal weight per unit area is materially higher at low consistences than at high consistences. The relation between density, stiffness, surface smoothness, absorbency and air transmitting capacity indicates clearly a coarsening of the pulp with increasing concentra-



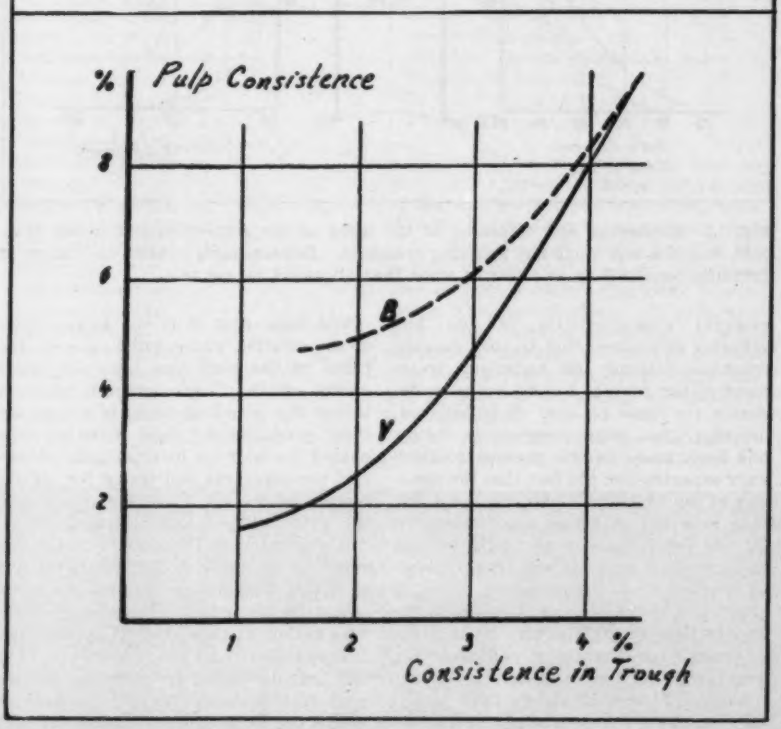




Fig. 11 (above)—Influence of consistency in the grinder pit. Experimental conditions: As in Fig. 5 except pressure at wood-stone contact, 20.4 pounds and peripheral speed 2960 f.p.m.

Fig. 12 (below)—Relation of stock consistency in the grinding zone to that in the grinder pit. V, experimental grinder; B, commercial grinder

tion. This tendency is confirmed by the strength studies. Figure 11 shows that the bursting resistance of the sheets at a given temperature of the pulp, decreases with increasing concentration—and more markedly at lower temperatures. The breaking length decrease is greater at higher concentrations and can really be counteracted there by using higher temperatures.

Figure 11 shows that the specific energy requirement necessary for attaining and maintaining a given pulp strength increases with increasing trough consistence, this increase being more rapid at higher concentrations. The curves become flatter as the temperature is increased.

## SIGNIFICANCE OF EXPERIMENTAL RESULTS

The results of the experiments, based on the variation of the trough temperature and consistence, show at first only external characteristics of the hot grinding procedure; that is, they provide recommendations for technical treatment of the process but do not give the reason for these results. It is believed, however, that some progress in theory has been made in the present preliminary experiments, the fact that the quantity of liquid conveyed by the stone surface into the grinding zone, measured by the consistence of the pulp leaving the grinding zone, is remarkably high at low trough consistences but drops off sharply with increasing concentrations, should help to explain why an increase of trough consistence, at constant temperature, leads to a lessening of the quality. Figure 12 shows two curves, one of which reproduces the values measured on the experimental grinder, while the other refers to investigations carried out independently by Sätre on a continuous grinder in commercial practice; the figure shows that the quantity of liquid reaching the grinding zone must exert a remarkable influence on the process. It will be involved in the friction and will determine the amount of vapor which developes in the grinding zone and which affects the wood ground. The hot liquid lifted out of the trough vaporizes rapidly and exerts a moistening and softening influence on the wood in the magazine. It was determined by special tests that this was so. The dry content of the wood at various heights in the stack was determined for a given rate of feed and the softness determined with the pressure of a ball (Figure 13). In cold grinding the moistening and softening effect extends only a short distance into the wood, which in this case was solid and homogeneous. The penetration is much greater at high dilution and temperature. High concentration diminishes the penetration due to less vapor being formed from the smaller quantity of liquid carried to the stone (Figure 12).

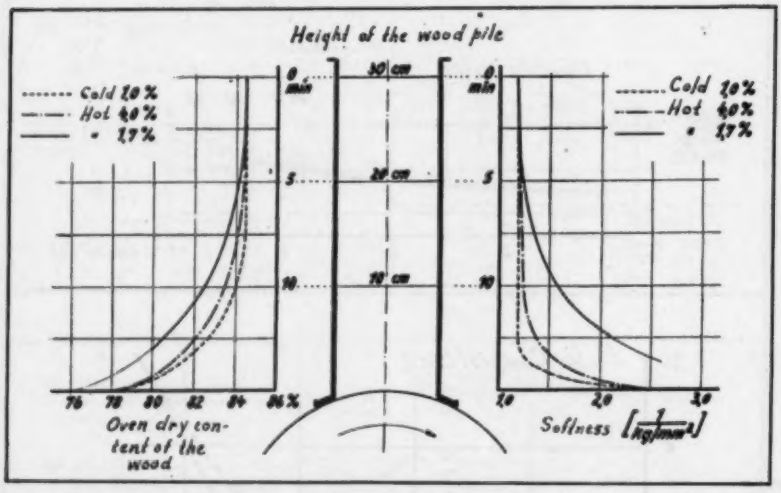



**Fig. 13—Moistening and softening of the wood in the grinder pocket in the thin-cold, thin-hot and thick-hot grinding processes. Experimental conditions: Area of grinding zone 28.7 sq. in.; rate of wood feed about 0.8 in. per min.**

The view that it is the temperature of the dilution water which, per se, imparts to the pulp the favorable properties of "hot" groundwood after it leaves the grinding zone, is erroneous. Pulp produced by cold grinding was heated for half an hour at each of several temperatures and tested for all different properties. No variation from the untreated pulp could be detected.

A summary of the results of the hot grinding experiments establishes the fact that the temperature in the trough is especially important in grinding. (Note: The author at this point gives an equation representing a heat balance between the heat developed in grinding and the heat in the shower water which determines the final temperature of the pulp suspension in the trough.—*Translator*[10]).

There are apparently two possible influences which can affect the trough temperature; (a) the temperature of the dilution water and (b) trough consistence. According to the results presented so far, it is the raising of the shower water temperature rather than of the pulp consistence which is to be chosen as the factor determining the behavior of the trough temperature. It is, therefore, advisable to take care, by all available methods, that the frictional heat liberated in the grinding process is saved to produce as high as possible a temperature of the back water and that all heat losses of the pulp suspension and of the water returning to the grinder are effectively avoided; it is even advisable that not only a sharp control of the shower water temperature be maintained, but also that special apparatus be provided in order to obtain a control of the temperature of the back water which is at least temporarily independent of the grinding process.

## CONCLUSIONS

The present work is based on some of the first investigations which were carried out in the past two years in the newly erected grinding laboratory of the Darmstadt Institute of Paper Making. Covering the technic of cold grinding procedure, the grinding angle, and hot grinding, the work has dealt with the whole range of white pulp production, using pinewood almost exclusively. The superiority in the quality of the pulp produced by hot grinding gave an incentive to undertake a thorough testing of the conditions under which hot groundwood is made, in which work the possibility which the laboratory offered of sharply isolating all the individual working conditions was especially advantageous. The results of these investigations, which proved the superiority of thin-hot-transverse grinding especially, confirm the practical experiences at other places during recent years, which experiences, however, were not generally applicable and lacked, up to now, a convincing experimental demonstration.

### References

(1) Translated and condensed from Papier Fabrikant 33, No. 13, 113; No. 14, 121; No. 15, 129 (1935).

(2) Director, Institute for Paper Making at the Darmstadt Technical High School.

(3) W. Brecht and E. Schaun, "Continuous Grinders and Pocket Grinders," Wochbl. Papierfabr. 62, No. 10, 223 (1931).

(4) Probably *Pinus Sylvestris* or "Scotch Pine." (Translator).

(5) P. Klem, "The New Research Flour Tester and Results on It," *Papierfab.* 30, 109 (1932). *Wochbl. Papierfabr.* 65, 708 (1932); V. Possaner and N. Windju, *Papierfabr.* 30, 375 (1932); Chr. Anker and Kaare Hang, *Papir Journalen* 20,. 225 and 269 (1932), *Papierfabr.* 31, 92 and 115 (1932); E. Meister and G. Foeth, *Wochbl. Papierfabr.* 64, 885 and 931 (1933).

(6) G. Strecker and U. Kirchner, "Grinding Wood in Small Quantities and the Production of Test Sheets," *Papierfabr.* 64, 80 (1933).

(7) The character used by the author closely resembles the Greek letter Zeta (Translator).

(8) Brecht and Hersberg, "The Influence of Damming the Pulp in the Trough upon the Grinding Process," *Wochbl. Papierfabr.* 65, Sondernummer 12 (1934).

(9) The photomicrographs of the original article have been omitted in this digest *(Translator)*.

(10) See Footnote 8.

# Superintendents Convention Outstanding Success

THE Seventeenth Annual Convention of the American Pulp and Paper Mill Superintendents' Association, held June 24, 25 and 26 at Grand Rapids, Michigan, proved to be an international affair. Not only were various paper-making sections of the United States represented at the several sessions, but there also was representation from Canada, England and Australia. It is believed that each of these delegates, whether from within the borders of the United States, from the neighboring country to the north, from the other side of the Atlantic, or from the far distant island continent of the South Pacific, received some real inspiration and benefit from this convention in the rekindling of old friendships, in the making of new friends, and in the acquiring of new information and in revitalizing some of the old.

The program was not overdone with formal papers. In fact, the number of such papers was kept to a minimum and a goodly amount of time was allowed for visiting exhibits that were arranged by various equipment manufacturers and supply organizations, for making personal contacts, and for enjoyment of the program of entertainment.

## First Day Activities

The activities of the first day of the convention included registration of delegates, mill visits, golf tournament, buffet luncheon for the tournament participants at Blythefield Country Club, visits to manufacturers' exhibits and a banquet in the evening at the Civic Auditorium which shared honors with the Hotel Pantlind as the meeting place for the convention.

### Exhibit Is Hub of Convention

The entire basement floor of the Civic Auditorium was given over to exhibit space. This space was taken up by the most extensive display of pulp and paper mill machinery, auxiliary equipment and supplies, and chemical raw materials that ever before has been exhibited in the interest of the pulp and paper industry, with perhaps the single exception of the Paper Industries Exposition that was held during the early part of 1923 in the Grand Central Palace, New York City.

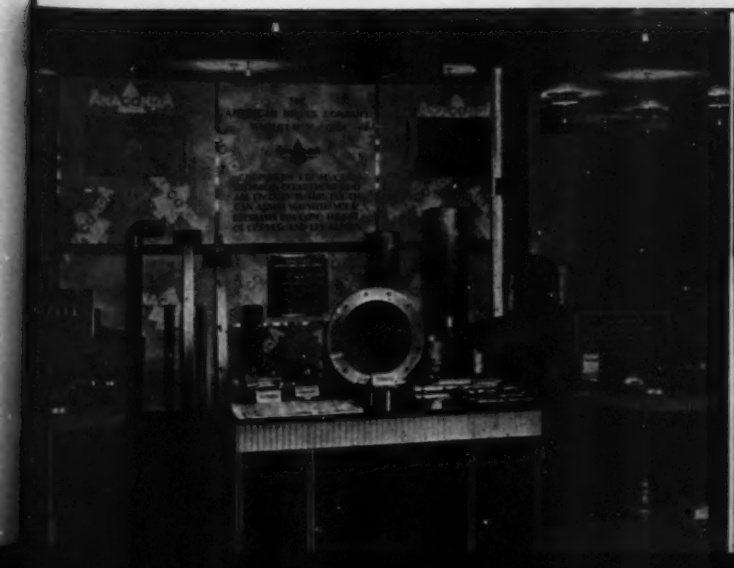
More than 60 firms, interested in doing business with pulp and paper mills, not only exhibited some of the products which they are making available, but also maintained representation at their respective booths throughout most of the day and evening hours in order that any visitor to any individual booth might obtain such information as he desired. The exhibition actually proved to be the next best thing to an actual shop visit to each of the firms participating in it.

Among the exhibitors were the following:

American Brass Company
American Cyanamid & Chemical Corp.
American Rolling Mill Co.
Appleton Machine Co.
Armstrong Machine Works
Automatic Transportation Co.
Beloit Iron Works
Bird Machine Co.
Cameron Machine Co.
Chicago Belting Co.
Chromium Corp. of America
Continental Diamond Fibre Co.
Covel-Hanchett Co.
Crane Co.
Dodge Manufacturing Corp.
Downingtown Mfg. Co.
E. I. DuPont DeNemours
Draper Mfg. Co.
Dumetallic Corp.
Duriron Co., Inc.
Edgar Bros. Co.
Employers' Mutual
Garlock Packing Co.
Gatke Corp.
General Electric Co.
General Elec. Supply Corp.
Gilbert & Nash Co.
L. H. Gilmer Co.
Great Lakes Supply Corp.
Greene Tweed & Co.
Heller & Merz Corp.
Herman Mfg. Co.
Horton Mfg. Co.
International Nickel Co.
Jenkins Bros. Co.
E. D. Jones & Sons Co.
Johns-Manville Co.
Lansing Stamping Co.
Samuel M. Langston Co.
Lewis-Shepard Co.
Link-Belt Co.
D. J. Murray Mfg. Co.
Nash Engineering Co.
O'Conner Screen Co.
Orr Felt & Blanket Co.
Paper and Industrial Appliances, Inc.
Paper Makers Chemical Corp.
Productive Equipment Co.
F. Rainville Co.
H. H. Robertson Co.
Rockwood Mfg. Co.
Joseph T. Ryerson & Son
Shartle Bros. Machine Co.
Sinclair Co.
SKF Industries, Inc.
Socony-Vacuum Oil Co.
Sound Engineering Corp.
Standard Oil Co. (Indiana)
Stearns-Stafford, Inc.
Trimbey Machine Works
Yale & Towne Co.

The extent of the exhibition may be more fully appreciated by a careful study of the various exhibits which are illustrated. These illustrations in no way cover the entire exhibition, but they do present a cross-section of it. Likewise, they indicate a progressive trend in supplying the manufacturer of pulp and paper with items of equipment or with supplies to decrease the cost of production, to improve conditions of operation, and to improve the quality of manufactured product.

It is understood that the various exhibitors expended more than $20,000 to



make the exposition possible and that the convention was financed through the income derived from selling exhibit space. Such tangible evidence of the support of the activities of the American Pulp and Paper Mill Superintendents Association by the allied industries is deserving of highest commendation and the thanks of the entire industry.

### Banquet Closes Program of First Day

Honorable John Collins, Mayor of East Grand Rapids, was toastmaster for the banquet on Wednesday evening, which closed the first day of the convention. In his remarks, the Honorable Mr. Collins referred to Major Bowes' program of Sunday evening, June 21, the City of Grand Rapids being the honor city for that program. He likewise called attention to the location of East Grand Rapids in relation to Grand Rapids, mentioned that it was a residential district and referred briefly to Grand Rapids itself.

After distributing the golf prizes to the winners of the tournament—a tournament that was said to be the best conducted in the history of the Association—the evening closed with the showing of technicolor pictures, taken in Western Michigan, and with dancing.

## Second Day Sessions

The more formal sessions of the convention opened on the morning of the second day when F. L. Zellers, of the French Paper Co., Niles, Michigan, and general chairman of the convention, called the meeting to order. The Rev. E. A. Thompson, D. D., then gave the invocation.

After the prayer, fitting tribute was given to association members who had departed during the past year. The names of the members who had passed on since the last convention were read by Robert L. Eminger, Secretary-Treasurer of the Association. This list included the names of: J. A. Adams, A. C. Cloudman, H. C. Ferguson, M. H. Haskin, O. B. Ingall, A. J. Kennedy, W. L. Ketchen, Thomas Legge, John B. Purves, James G. Ramsey, John S. Schumaker and Joseph H. Slater.

After the reading of the names, Dr. Thompson followed with the "In Memoriam."

### Henry W. Walstrom Welcomes Delegates

Visiting delegates to Grand Rapids were welcomed by Henry W. Walstrom, a paper jobber, who paid tribute to the pulp and paper mill superintendent. He said that much better paper for about one-half the price could be obtained today than it was possible to get only a few years ago. Grand Rapids was cited as a city of homes, parks and playgrounds, fine churches, excellent schools and efficient government. The tax rate for the city was said to be low, and the fire losses small. Likewise, the city was said to have won second and third place among cities of its size in the national safety contest for the past eight years and to have won second place for the

CHARLES CHAMPION
Retiring President

past three years among cities east of the Mississippi as a city of health. Mr. Walstrom also pointed out the diversity of Grand Rapids industries, commenting, of course, upon the prominence of the furniture industry.

This pleasing welcome was responded to in behalf of the association by B. D. Milledge, mill manager of Howard Smith Paper Mills, Cornwall, Ontario, and second vice president of the association.

### President Champion's Message

The response of Mr. Milledge was followed by the message of the president. In this message, Charles Champion, of the Millers Falls Paper Co., and president of the association for the past year, called attention to the difficulty involved in running a mill and filling the duties of president of the association at the same time. He mentioned his interest in the association, called attention to the appointment of George W. Craigie as field secretary, and suggested that his duties will be to attend and to help in the arrangement of divisional meetings and of the national convention. Mr. Champion also complimented Robert L. Eminger, secretary-treasurer of the Association, for his efficient, faithful and honest efforts in behalf of the organization; he thanked the *Paper Mill and Wood Pulp News*, the official organ of the association, for the excellent manner in which it publicized the Grand Rapids meeting; and he praised Mr. Zellers along with his committee for the splendid job which they did in handling the details of the convention and in arranging for the exposition.

After expressing his pleasure at serving the association as president, Mr. Champion turned the meeting over to the Miami Valley Division of the Association, and to Homer Latimer, of the Beckett Paper Company, Hamilton, Ohio, in particular, for the purpose of conducting an open forum on mill problems.

### Open Forum on Jordans and Refiners

In taking charge of the meeting, Mr. Latimer made it clear that the discussion was to be confined to jordans and refiners; he suggested that refiners had become vital to the development of fiber during the past few years; and he inferred that the purpose of refiners was different from that of jordans.

**Purpose of a Refiner**—The first question raised by Mr. Latimer considered the purpose of a refiner. The refiner was stated to be an attempt to develop strength of fiber with a minimum reduction in length and to hydrate rather than cut. The possible condemnation of refiners because of lack of capacity was

touched upon briefly as was the number of types of refiners and the appearance of the individual fiber after leaving a refiner as compared to a similar fiber after leaving a jordan. In the latter case it was stated that fiber ends are square after leaving a jordan; that this is undesirable; that beating develops frayed ended fibers; and that a refiner produces a rolling, brushing and bruising action to the stock.

**Refiner in a Board Mill**—Some time was spent in discussing the success attained through the operation of a refiner. In one case, it was pointed out, a refiner in a paperboard mill was utilizing 150 hp. and was doing better work than a 300 hp. jordan; that the refiner-treated stock resulted in better finish; that the use of a refiner permitted a great reduction in beating time on boxboard liner; that refiners in the plant in question were operating under pressures as low as eight pounds and as high as fifteen pounds; that the quality of pulp for liner can be reduced when a refiner is used; and that although consistency of stock to a refiner should be rather light, make-up water should be added later.

**Refiner and Jordan Differ**—A direct comparison was made of the relative sizes of a refiner and a jordan. The refiner, likened to a baby jordan, was stated to operate at much higher speeds and under higher pressures than the usual jordan—it being intimated that the increase in pressure was more beneficial than setting up the plug on a jordan.

A case was cited where 50 pounds pressure was carried on the jordans—a gauge with a loop of oil in it being installed ahead of each jordan to indicate the operating pressure. The consistency of stock going through the jordans so installed was said to be 6 per cent, and the operating speed of the jordans, 360 r.p.m.

Issue was taken to the statement that a refiner is a small jordan and a counter-statement was made in which it was emphasized that a refiner is not a small jordan, that a refiner filling is different from a jordan filling; and that a refiner and jordan are two separate and distinct things.

**Refiner Increases Pop Test**—Another case study was cited in which a mill producing high grade sulphite bond and equipped with four beaters and two jordans made some rather recent and detailed tests with a refiner. The refiner was located between the beaters and jordans and tests were made for pH, fiber length, freeness, and for other characteristics with the result that the mill now is operating with two beaters, one refiner and one jordan. The use of the refiner increased the pop test six points, thus allowing the use of a cheaper furnish if desired.

**Good Results With Vertical Refiner**—A pertinent question was asked about the results being obtained in one mill producing sulphite bond and tissues with a vertical refiner. The results were said to be very good; that four beaters were formerly in use and that only one is in use now together with the vertical refiner; and that the refined stock was touched only lightly with two jordans.

**F. J. TIMMERMAN**
**Newly Elected President**

**Refiner Not Desirable for Blotting Stock**—The question of whether a refiner installation is justified on a free stock paper such as book, blotting, cover and offset was considered. In this consideration, it was emphasized that a refiner might be desirable on book and perhaps on cover and offset, but not on blotting.

**A Book Mill That Uses No Refiners**—The practice of one book mill, in which no refiners are used, was described. In this installation, three jordans are used ahead of a machine—two with wide bars and one with narrow or sharp bars—in order to get any combination of action on the stock that might be desired.

**Refiners in Parallel and in Tandem**—Reference was made to the installation of refiners in parallel and in tandem with jordans, and as batch operating units in conjunction with beaters.

**Two Unsuccessful Operations**—An unsatisfactory experience of one type of refiner was told by the superintendent of a specialty mill that produces an extensive line of colored papers. This machine was said to develop a foam problem that necessitated it being removed from operation. Another superintendent said that he had tried a high speed refiner on glassine stock without success.

**Board Mill Reports Successful Installation**—In contrast to the two unsuccessful applications, another board mill superintendent called attention to a most successful installation in his mill where three refiners were stated to eliminate the need for beaters. One of them, equipped with 125 hp. motor and operating at 1800 r.p.m. on mixed stock, has a capacity of 150 tons per day. Each of the other two machines, operating at 900 r.p.m. and equipped with a 50 hp. motor, handles 75 tons per day.

These machines were stated to operate with a slight suction on the inlet and with 12 to 25 pounds pressure on the outlet.

In the opinion of the superintendent who commented upon this installation, it would be difficult now to run his mill without them. Their use has increased various physical tests made on his board, has improved its formation and its drying behavior, and as a result has increased production.

**Performance of Refiner on Rope and Jute**—One other experiment with a refiner was related by a superintendent in connection with its use on rope and jute. In this instance, stock was passed through a refiner once, twice, and three times, with the resulting conclusion that the refiner did not save power to get the same degree of refining as obtained with

a beater—that the only saving was room.

**Another Refiner Application**—Another satisfactory application for the refiner that was mentioned during the open forum was its use for breaking up unclear stock after leaving the thickener of a de-inking installation.

**Closing Discussion on Refiners**—In closing the discussion on refiners and opening the discussion on jordans, Mr. Latimer ventured the guess that the power consumption of a refiner might increase as the square of the speed.

**Jordans in Tissue Mill**—The jordan discussion was not nearly so extensive as the discussion on refiners. One tissue mill layout in which two jordans are used on each machine with capacities ranging from 500 to 700 pounds per hour was mentioned briefly. In this same mill it was pointed out that pulp brushers are used on two machines. These brushers, it was stated, have a capacity too small for machines of any size. Mention likewise was made of a very small jordan which is being used by some tissue mills in the East with very good results.

**T.A.P.P.I. Attempts Standardization**—Work of the Technical Association of the Pulp and Paper Industry in attempting to standardize jordans on a basis of capacity was cited and reference made to the capacity of three different jordans on a basis of contact yards per revolution rather than contact inches because of the more convenient resulting figure. One of the three jordans had 5,000 cutting yards; a second, 17,000; and the third, 40,000. One jordan used on free stock was equipped with 1/8-inch bars; another with 3/16-inch; and the third with 3/8-inch.

**Pressure Jordaning**—Pressure on the jordan, rather than bar width, when producing sulphite bond, is the more important in the opinion of one superintendent. He further described a pressure jordan installation in which he stated in part that the jordan was operated under 30-40 pounds pressure; that stock consistency approximated 3 per cent; that pressure on the intake was developed by a centrifugal pump equipped with a 20 h.p. motor; that a pressure valve was located in discharge side; that a 5/16-inch hard bronze filling within jordan does not mushroom; that no packing trouble is experienced; and that the jordan handles two tons of stock per hour.

In the discussion of pressure jordaning which followed, it was brought out that no trouble should be experienced with plain bearings on any jordan operating in this manner since the pressure on inlet and outlet would be equalized and there would be less thrust. As a precaution, it also was pointed out that the jordan shell must be made strong enough to withstand the pressure developed by the pump. Likewise, mention was made of an increase in production through pressure jordaning from 38 to 43 tons, and of power savings with better results on the paper machine. At this point, it was stated that short fibers make cockle on sulphite bond; and a reference was made to the use of pressure jordaning on rag content papers in one mill where the rag content varied from 25 to 100 per cent and the jordan pressure varying with the furnish.

These remarks completed the open forum, and, after Mr. Zellers had complimented the Miami Valley Division and Mr. Latimer upon their activities, the session was adjourned by President Champion.

### Six Group Meetings Held

The afternoon session of Thursday, the second day of the convention, was given over to group meetings of which there were six; namely: Soda and Sulphate; Sulphite Pulp; Groundwood; Board; Book, Fine Papers, and Coating; and Tissue.

## SODA AND SULPHATE GROUP

Three papers were scheduled for presentation before the Soda and Sulphate Group. The first of these papers was the subject of R. M. Radsch of the Appleton Machine Company, and was entitled "Modern Trends in the Manufacture of Kraft Pulp and Paper."

### Kraft Manufacturing Trends

Mr. Radsch stated that the recovery of chemicals always has constituted the major problem in this process of pulp making. He referred to the work of Hugh K. Moore in 1915 at the La Tuque mill of the Brown Company as the forerunner of modern developments in soda recovery; mentioned that the Wagner furnace was introduced a short time later; and emphasized the fact that a soda recovery unit of today is a highly specialized combination of chemical reclamation and steam production.

Attention was called to the Ross-Wagner and the B & W Tomlinson systems which utilize steam vacuum evaporator concentrated black liquor to spray into a combined smelting furnace boiler unit; to the Waern recovery unit, a greatly improved modification of the original standard installation, which comprises a water cooled smelting furnace unit, rotary incinerator discharging black ash directly into the furnace, boiler unit and disc evaporator for the recovery of chemicals from the flue gases prior to their discharge; and to the Goodell system of kraft chemical recovery in which a combined smelter boiler furnace is fired with a 98 per cent dry powder containing the chemicals to be reclaimed. In the opinion of Mr. Radsch, modern units of this kind and others which have been developed should produce enough steam for the entire operation of a kraft pulp mill with perhaps 10 per cent to spare for the use of the paper mill.

Mr. Radsch further stated that digester building equipment has seen little change (both tumbling and stationary digesters still being used). He cited the Sandberg Central Valve connecting digester blow line to diffusers as a marked improvement over previous devices used; and commented favorably upon the Sandberg motor-driven, ball-bearing swivel joint and quick-connecting coupling for making diffuser piping connections and upon the Sandberg automatic diffuser valve which is handled from the operating floor, and which easily and automatically empties the pulp from the diffusers.

Mention was made of the Rosenblad combined spray condenser, accumulator, filter, and spiral heat exchanger to recover the heat units from digester blow steam. Likewise, it was stated that the use of the diffuser in pulp washing is still standard practice although late developments and improvements in vacuum drum washer design indicate their success in this application. All trouble from foam, said Mr. Radsch, has been overcome and it seems that the problem of washing kraft pulp made from either northern or southern woods on vacuum filters has been solved successfully.

Mr. Radsch, in continuing his remarks, stated that the old-type, horizontal tube, vacuum steam evaporators are being supplanted rapidly with forced circulation and film type equipment; that great improvements have been made in the causticizing department of kraft mills through the use of continuous and high capacity equipment which makes it possible for a modern mill to operate consistently with a sodium sulphate consumption of not more than 260 pounds per ton of pulp produced; that wood handling and wood room equipment have seen improvements but practically no radical changes; and that perhaps the least amount of change in the production of kraft paper has taken place in the paper mill proper.

In concluding his remarks, Mr. Radsch gave credit to the comparatively recent work of the combustion engineer in the field through which much has been learned as to details of operation and the achievement of economies.

### Control Problems in Sulphate Mills

G. Enderlein, chief chemist of the Mosinee Paper Mills Company, was the contributor of the second paper before the Soda and Sulphate Group meeting. His subject treated largely of the control problem in the sulphate pulp and paper mill and the use of instruments in improving operations. The presentation included numerous questions as the paper was developed for the purpose of creating discussion.

Among the questions raised by Mr. Enderlein were:

Is the wood buyer fully posted on what pulp mill superintendents have to do to correct for variations in wood?

Can he help by purchasing through large operation and more careful inspection before pulpwood is shipped?

Can the buyer or superintendent look at the wood and tell much about it?

Have we determined the right method of seasoning for best results, or are we expected to adjust cooking to each and every kind of wood that is put through the wood room?

Why do we have variations in the cooking process when chips are uniform, well-screened, and have only a slight variation in moisture content?

Does a mature wood have better fiber than sapwood?

Is there better fiber in a dense wood?

Is there any difference in wood that has been stored or rossed?

Does a stationary digester with circulating system, stationary with heater and circulating system, or a rotary give best results in quality and uniformity?

Has the sulphate industry gone to as accurate control through instruments and charts as the sulphite?

**FRANCIS D. BOWMAN**
**Who Arranged the Entertainment**

Do we know accurately when steam was put on?

How accurately was the liquor run in?

How long was the cooking time?

"Instruments," said Mr. Enderlein, "are not a luxury but a necessity. It is impossible," he continued, "to get good control with only man-power, but with the help of instruments it is possible."

The concluding remarks of Mr. Enderlein stressed the need for co-operation between the superintendent and chemist, it being pointed out that the chemist must not overlook production problems or become too theoretical, and that the superintendent must not be unwilling to try out new ideas and that he must not belittle suggestions originating in the laboratory.

### Reducing Stream Pollution by Waste Utilization

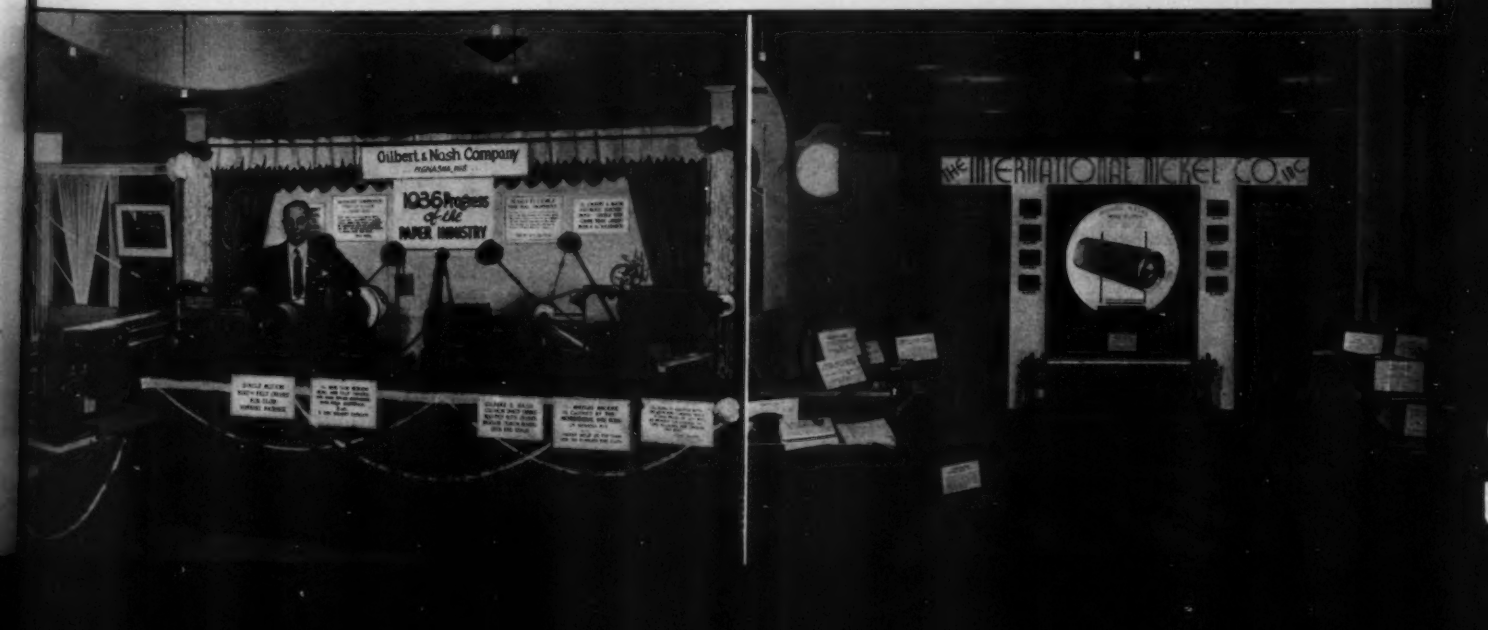
The third and last paper scheduled for presentation before the Soda and Sulphate Group meeting was entitled "Waste Utilization and Reduction of Stream Pollution." It was a joint paper by L. F. Warrick and J. M. Holderby, State Sanitary Engineer and Assistant Sanitary Engineer, respectively, of the Wisconsin State Board of Health.

The paper, presented by Mr. Holderby, suggested that a considerable measure of credit must be extended to mill superintendents, in many cases where wastes are being successfully recovered or treated to remove fiber and chemical substances of a pollutional nature, for profits realized and stream improvement accomplished. Reference was made to the increasing public interest in clean streams and to the establishment of governmental, industrial and other agencies to undertake co-operative studies to work out suitable means of reducing these wastes to a minimum, and to bring about the necessary stream improvement.

The procedure employed by the Wisconsin Board of Health in making mill waste surveys was explained and waste survey results discussed. In this discussion of results, it was brought out that, for a group of 39 mills, unit waste flows and fiber losses decreased steadily from 1931 to 1933 and that while they increased somewhat in 1934 they decreased again in 1935 to values somewhat lower than the previous minimum. The same fact was noted to be true for the individual classification of mills except sulphite, where group values for 1935 were found to be somewhat lower than in 1934 but higher than in 1933 or 1932. Likewise, it was brought out that these 39 mills in 1931 were sending to the streams of the State daily some 107.6 tons of fiber worth $4043.41, while in 1935 they were wasting daily 55.4 tons worth $2051.90.

Noteworthy in the paper mill group, it was commented, is the large number of mills with fiber losses below 2 per cent. Ten mills were said to have losses of one per cent or less.

The most common complaint in Wisconsin, it was stated, relates to the effect of chemical pulp wastes on fish, and



resulting damage to recreational and conservation interests. In this connection, it was pointed out that studies have revealed that the primary effect of sulphite and sulphate waste liquors on fish life is through removal of the dissolved oxygen from the water.

Reference also was made to the progress being made with the Howard process for utilizing sulphite liquor and it further was suggested that careful study had been given the Paulson process in recent years. Likewise, in commenting upon soda and sulphate mill wastes, it was stated that pollution from these mills is often rather severe, due to inefficient operation of recovery units, and, in some cases, to the economical degree of recovery being somewhat less than enough to protect the receiving stream.

In conclusion, it was stated that paper and wood pulp mills generally can be reasonably expected to reduce their fiber losses to one per cent or less of their production, and that public sentiment in the not distant future may demand the elimination of waste sulphite liquor in its raw state from our water courses.

## SULPHITE PULP GROUP

S. E. Tomczak of the Flambeau Paper Co. presided over the sulphite pulp group meeting before which four papers were presented.

### Developments in Sulphite Bleaching

The first of these papers, "New Developments in Bleaching Sulphite," was a joint paper by Dr. T. A. Pascoe, R. P. Hella, and J. W. Stevens of Northwest Paper Company and was presented by Dr. Pascoe.

This paper was divided into two major parts. The first portion discussed some of the more recent advances in bleaching practice; while the latter portion explained steps that the average established mill can take to bring its product into favorable comparison with that of newer mills.

The most important advance in bleaching practice since the advent of high density and two-stage hypochlorite bleaching, stated Dr. Pascoe, has been that of direct chlorination. Other advances which he mentioned included the development of reliable and quick bleachability tests, the adoption of multiple stage bleaching using three or four stages with interposed washing and chemical treating operations, and the evolution of new bleaching agents, the one showing most promise being stated to be hypochlorous acid.

The chief advantage of direct chlorination, continued Dr. Pascoe, lies in a saving in total chlorine required to bring a given pulp to a desired color. Another advantage was said to be that its use allows the preservation of more of the native strength of the pulp.

Dr. Pascoe, likewise, told of two precautions to be observed in the direct chlorination of pulp. He pointed out that deterioration of the pulp can be brought about, if, for any reason, it is allowed to stand for long periods in the acid condition. The other precaution had to do with the carrying over of wood dirt into the finished bleached pulp—the rapidity and mildness of the reaction with chlorine resulting in less effective removal or bleaching of so-called wood dirt than is usually experienced with hypochlorite bleaching. From 50 - 60 per cent of the total chlorine demand, it was said, may be supplied as direct chlorine in the first stage when a short time high density hypochlorite bleaching is employed for the second stage.

The use of the General Electric reflection meter (or similar apparatus) in connection with the making of rapid bleachability tests (preference being expressed for the so-called permanganate method) makes it possible, said Dr. Pascoe, to bring the bleached pulp to exactly the same readily designated brightness.

In taking up the second part of the paper, Dr. Pascoe referred to the work that had been done in one sulphite mill to improve the quality of its bleached pulp. The mill, equipped with three digesters with a capacity of 75 tons daily, was designed originally to produce only unbleached sulphite, but 2 - 5 ton high density bleachers had been installed later.

About one year ago, the paper mill with which the sulphite mill was integrated demanded stronger sulphite with equal or higher brightness than was being produced. An investigation showed that the unbleached pulp exhibited the requisite strength, but that the bleaching was responsible for serious degradation of the pulp.

Previous successful experience with batch chlorination of alkaline cooked pulps indicated chlorination of the sulphite pulp as the solution to the problem. Therefore, continuous chlorination equipment was selected, installed, and placed into operation with results that indicate that an acceptable bleached sulphite from spruce wood can be obtained through careful control by means of bleachability tests and through the use of a two-stage chlorine-hypochlorite system of bleaching for such circumstances where multiple stage bleaching is contra-indicated for reasons of space, investment and the like.

### Sulphite Liquor Recovery

The second paper presented before the sulphite pulp group meeting was the subject of Guy C. Howard of Marathon Paper Mills Company and was entitled "Waste Sulphite Liquor."

In this paper, which was in the nature of a progress report on the developments at Marathon Paper Mills Company in processing waste sulphite liquor insofar as it relates to stream pollution, Mr. Howard described the process employed; discussed the recovered products and credit items of the process; revealed the operating expense and investment for the process; and touched upon the manufacture of cooking acid containing recovered calcium mono-sulphite without change in digester operations, the value of fuel product obtained in the process, the process in relation to stream pollution, and the applicability of the process not only to liquors resulting from a calcium base cooking acid but to ammonia-base acid as well.

The process, in brief, includes the recovery of fiber in the concentrated and dilute drainage from the blowpits, and the processing of the liquor thus obtained with caustic lime. From 3,500 to 4,000 gallons of liquor are processed per ton of pulp—this amount, it being stated, carrying 90 - 95 per cent of the organic matter dissolved in the digesters.

The recovered products and credit items of the process that were listed

included sulphur and lime for making acid, organic matter for use as boiler fuel, pulp now lost in blowpit drainage, heat from process effluent recovered as hot water for mill uses, reduced steam consumption in acid plant during winter, less upkeep expense on acid towers, easier controlled and more uniform cooking acid, probably some economies due to improved pulping action of cooking acid made from the recovered products, and an improved effluent as regards stream pollution. The recovered fuel product, it was stated, will amount to around 1250 pounds dry weight per ton of pulp from hemlock liquors and somewhat less for spruce liquor—the fuel having a calorific value around 8500 B. t. u.'s per lb. dry weight with 18 per cent ash by ignition.

The lime reagent was said to be by far the largest item of operating expense, the amount ranging from a minimum of 275 pounds of CaO per ton of pulp production to a maximum of 350 pounds as determined by liquors from different mills; while plant investment for the process was stated to range from $1,000 to $1,500 per ton of pulp production, depending on size of plant, local conditions, and details of design and construction. It likewise was pointed out that the process removes nearly 50 per cent of the organic matter in the raw liquor, an amount which together with a resultant reduction in oxygen demand should be sufficient, according to Mr. Howard, to avoid stream pollution under most mill conditions.

### Strong Acids and High Pressures in Pulping

John M. McGovern of the U. S. Forest Products Laboratory presented the third paper on the program of the Sulphite Pulp Group meeting. In his paper, entitled "The Effect of High Sulphur Dioxide Concentrations and High Pressures in Sulphite Pulping," he described the pulping of several species of wood by the sulphite process through the application of strong acids (up to 20 per cent sulphur dioxide) and high pressures (up to 500 pounds per square inch).

He said that penetration of chips was shown to be materially hastened by increases in temperature and acid concentration that high pressure alone (without strong acid) was not effective; that time of cooking at constant temperature to produce pulps of equal bleach requirement was decreased nearly 50 per cent by use of strong acid, the yield and quality of pulp being approximately the same; and that the use of strong acids, when cooking to a predetermined bleach requirement, permitted a reduction in maximum cooking temperature of 10 to 20 deg. C. without any increase in cooking time and with an actual improvement in yield and pulp quality.

ROBERT L. EMINGER
Secretary-Treasurer

### Continuous Cooking System

"Continuous Cooking of Sulphite Pulp" was the title of the last paper to be presented before the sulphite group meeting. This paper was the subject of H. D. Wells of American Paper Machinery & Engineering Works, Inc.

Mr. Wells described a novel process in which thin wood shavings are pulped continuously by a combined chemical cooking and mechanical defibering method. The shavings, produced by passing barked and cleaned wood through a wood shavings machine, are fed automatically into a pulper where they are mixed with cooking liquor and water before being passed on to thickeners and digester-hydrafiners for treatment. Steam and cooking liquor are added to the shavings entering the digester-hydrafiners and the pulp which issues from them is returned to the pulper. At this point in the cycle of operations, the fiber is screened out and the stream of fluid fibers passes on to a consistency and cooking liquor regulator. This regulator, in turn, maintains desired proportions of shavings, cooking liquor, and water; and controls the stream of fluid pulp passing through the process. The stream of pulp, discharging from the regulator, is diluted with water to screening consistency and then is screened over a perforated plate screen. The coarse material goes back to pulper for further treatment. The acceptable fibers and fluid pass on to slotted plate screen for final screening and then to washer-thickeners where the waste liquor, fine dirt, etc., is washed from the fiber. The washed and thickened fiber then passes to storage chest as unbleached stock and from which it may be taken for use as unbleached stock or for bleaching.

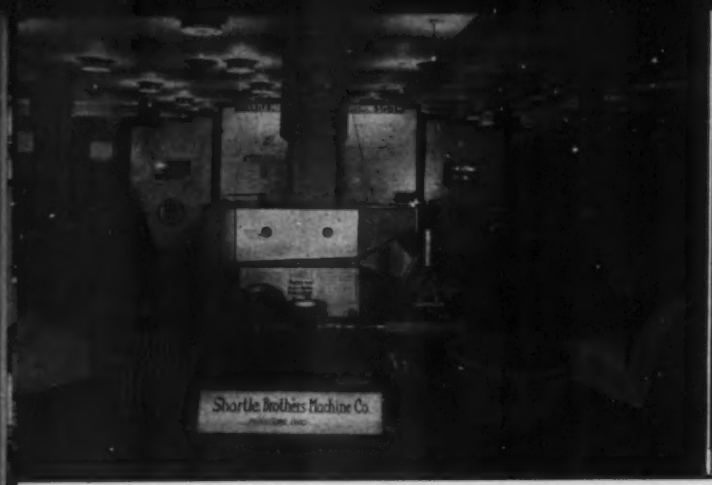
This system was suggested, not only for sulphite pulp but for soda, sulphate, and groundwood pulps as well, the groundwood pulp produced in this manner requiring no cooking liquor and no steam.

### GROUNDWOOD GROUP

Only two papers were scheduled for presentation before the groundwood meeting over which Sidney D. Wells, Consulting Engineer, presided as chairman.

"Grinding Pulp With Laboratory Assistance" was the title of the first of these papers. It was the subject of George K. Walker of Finch, Pruyn & Co., Inc.

Mr. Walker referred to his paper presented last year at the Richmond meeting; stated that in October, 1935, a laboratory was installed in the mill with which he is associated; and suggested that since the installation of the laboratory an attempt has been made to measure the results of all variables that enter into the grinding of pulp produced in the mill. He said that the two most important pieces of equipment installed in the laboratory were a sheet making mold and an electric Mullen tester. The



use of this equipment, commented Mr. Walker, has furnished data which has made it possible to increase the strength of pulp by using a little different method of burring or, in some cases, by changing the burrs.

A number of charts were used to illustrate his paper. One showed the reduction of average spread of Pounds-Mullen before and after burring over a six months period—the spread being reduced from 3.4 pounds in October to 1.3 pounds in March. Two others show the results obtained by changing burrs on two different 50 grit Norton stones. A fourth chart, covering grinding data for a five months period, illustrates the h.p. per ton, temperature at the grinder pits, burring cycle in hours and tons per stone. A fifth chart includes four different curves based on a seven month period—one covering Mullen strength of regulated stock, another covering freeness of regulated stock, a third covering consistency at grinder pits and a fourth showing paper production in tons per day. A sixth chart shows the decrease in per cent of sulphite and increase in paper strength over a seven month period; while a seventh chart shows that, as the sulphite furnish was decreased and the groundwood pulp improved, there was an improvement in smoothness (Bekk) on both the top and wire sides of the paper produced on one of the machines in the mill.

In the opinion of Mr. Walker, because of this and additional data, his mill has made more progress in improving the quality of its groundwood within the past six months than had been made in the previous eighteen years. He, likewise, expressed continued satisfaction with the Great Northern Grinders which were installed some time ago in his mill; stated that stone cost is about six cents per ton actual measurement each month; suggested that tailings average about two per cent; and mentioned that these tailings are refined in a Haug refiner using 40 h.p.

### Grinding With Artificial Pulp Stones

In introducing the second paper of the group meeting on the subject of "Mill Performance of Artificial Pulpstones," R. I. Wynne-Roberts, of the Norton Company, made it clear that his observations would be restricted largely to Norton stones because of his greater experience with them; and further commented that the Norton stone made its first bow to the paper industry a little over ten years ago; that since that time over 700 of them had been installed; that a number of mills are equipped 100 per cent with them; that over 35 per cent of the groundwood manufactured in the United States is produced on them, and that the present mechanical excellence of the stone is the result of many years of careful study and development in which suggestions of customers have played an important part.

With this introduction, Mr. Wynne-Roberts proceeded to list the advantages of the artificial stone. These advantages, briefly summarized, included the following:

(1)—Quality of stock may be adjusted to meet any requirement, and product may be maintained exceptionally uniform throughout the burring cycle.

(2)—Stones of like specification will be similar in grinding characteristics whether made this year or five years hence.

(3)—The average wear of the artificial stone is approximately one cubic inch per ton of pulp as compared to about 15 cubic inches for natural stones.

(4)—Artificial stone responds more readily to surface dressing and impression is always definite and clear cut—Norton stones sustain a burring cycle of from one to six days in length, depending on grade of pulp being made and quality and species of wood being used.

(5)—Burr cost per ton of pulp is low.

(6)—Higher daily production is usually obtained.

(7)—Slow rate of wear of artificial stones requires less frequent setting of grinder pockets.

(8)—Unit cost of artificial stones per ton of pulp is ordinarily less than that of natural stones—a stone cost of 5 to 6 cents per ton being maintained in a news mill over an interval of time.

(9)—Norton stone consistently produces quality pulp with less waste.

(10)—Artificial stones possess a factor of safe operation that tends to minimize stone breakage.

Stone characteristics that have been found desirable in the production of groundwood pulps next received the consideration of Mr. Wynne-Roberts. To touch only the high spots, he stated that coarse-grained, fairly hard stones are used for producing groundwood for board; that medium gritted stones of normal hardness are used for producing groundwood for hanging (freeness varying from 150 to 300 cc. Canadian standard); that several grit combinations have been found very successful for news groundwood, depending upon type of grinder used and quality of pulp required (freeness varying from 80 to 150 cc.); that medium to fine grit stones of normal hardness, producing long fibered stock at a good production rate for low freeness (60 to 100 cc.), have been used for tissue stock; and that fine gritted stones of special combinations to produce a fine fibered stock free of waste and with a freeness of 50-80 cc. have been used for rotogravure.

Among the other interesting facts pertaining to artificial stones that were brought out by Mr. Wynne-Roberts were the following:

High quality pulp (within limits) is better maintained on any given stone by judicious use of burr rather than the use of a particular type of burr. A coarse stone would have difficulty in maintaining a slow stock and likewise a fine gritted stone would not be suited to the continuous production of free stock without undue manipulation.

It has been found desirable to make artificial stones of medium hardness to limit stone wear, but not so hard as to make burring a difficult task.

Crystolon (silicon carbide) abrasive is believed to be more desirable than Alundum (aluminum oxide) abrasive for meeting conditions ordinarily imposed on pulpstones.

Mr. Wynne-Roberts likewise stated that the Norton Company has experimented for the past year or so with a new joint material; that this material wears away flush with the abrasive and allows a very uniform burr pattern; that a stone with about 35 per cent less abrasive but in other respects identical to standard stones has been designed to meet special circumstances; and that now a comprehensive program of research and development work is being embarked upon to obtain reliable and authentic information on the groundwood process and on the grinding performance of artificial stones.

### BOARD GROUP

The first paper on the program of the Board Group meeting, over which E. C. Gildenzopf of the Schmidt & Ault Paper Company presided as chairman, was a

paper by W. L. White, Director of Research, Manhattan Rubber Company, on "Paper Machine Rolls from a Rubber Man's Viewpoint."

### Rubber Man Talks on Paper Machine Rolls

In the early part of his paper, Mr. White discussed the properties and source of rubber and told something of its history. In these remarks he mentioned that practically all rubber today is obtained from the Para rubber tree, a tropical evergreen tree indigent to South America; that Columbus is credited with having been the first white man to discover rubber; that 98 per cent of the world's present supply of rubber comes from huge rubber plantations in Ceylon, Java and Sumatra; that the ordinary rubber plantation, with the present price of rubber at about 16 cents per pound, has a gross return of about $64 per acre per year; that acid, friction, heat or bacterial action will curdle latex and coagulate it in a manner similar to the way milk sours; that the inception of the rubber industry can be traced back to a patent issued in 1791 to Samuel Peal; and that Charles Goodyear, about 100 years ago, discovered the process of vulcanization—fundamentally a reaction between rubber and sulphur.

With these facts and others as a background, Mr. White explained the process of compounding and calendering rubber for use in making rubber-covered couch and press rolls. He said that the materials used in compounding rubber may be divided into seven classes, and he named them in the order of their importance: rubber, sulphur, reinforcing pigments, accelerators, activators, softeners and antioxidants. Calendering, it was pointed out, simply rolls out slabs of compounded rubber into long sheets—these sheets being used for building up a rubber roll through winding them with great care around an iron center until the desired thickness is attained.

Most of the remainder of Mr. White's paper discussed the actual making of the roll. In this connection, he stated that a good center is as necessary to a roll as a good foundation is to a strong building; that it is necessary to remove scale and dirt from the iron center in order to get good adhesion to the metal; that a coat of rubber cement or rubber-to-metal adhesive, applied to clean center, protects cleaned metal from atmosphere and makes a more intimate contact with the metal than could a sheet of rubber; that a thin sheet of hard rubber base stock or some other binder material, is now applied; that it is followed by the face stock; that the roll, after makeup, is wrapped with cotton tape to compress the rubber and to hold it under pressure during the cure; that the roll is then put in large autoclave for vulcanizing and cured by bleeding in steam under pressure; and that, after

GEORGE W. CRAIGIE
Field Secretary

vulcanizing or curing, the cotton wrapper is stripped off and the roll finished by grinding (usually dry) in a lathe or grinder.

The finished roll, continued Mr. White, is now tested for size (some rolls being held to a tolerance of plus or minus .002 inch, for crown (if crowned) and for density or hardness. Brief reference likewise was made to the new synthetic rubbers or rubber substitutes (Thickol, Duprene, "Buna" rubber), and to several other uses of rubber in the paper industry; namely, rubber belting, tank and piping lining and corrosion-resisting covering for continuous filters and pulp de-watering machines.

### Stock Preparation and Production Records

R. D. Kehoe, of Paper and Industrial Appliances, Inc., presented the second paper of the afternoon before the Board Group meeting. His subject was "Dealing with Mill Operating Records on Stock Preparation and Production" and covered largely remarks regarding the various items of equipment that are handled by his concern. The presentation was made through an extensive use of lantern slides to permit visual interpretation of the facts as elucidated. Among the items of equipment to which reference was made were the Thorsen-Hery beater, the Poirier weight governor, the hydraulic beating system with hydraulic target and the Sturtevant bale pulper.

### Moving Pictures Illustrate Modernization

To show the modern trend in board machines, motion pictures were exhibited by Cliff Walton of the Downingtown Manufacturing Company, which illustrated some of the work that has been done by the Downingtown organization to improve operating conditions on a number of old board machines within the industry.

## BOOK, FINE PAPERS, COATING GROUP

Two papers were scheduled before the Book, Fine Papers, Coating Group meeting with J. H. Simpson, of Champion Paper and Fiber Co., and H. Annis of Allied Paper Mills, as chairmen.

### Moisture Control on Paper Machines

The first of these papers was the subject of H. O. Ehrisman, of the Foxboro Company, the paper being entitled "The Necessity of Moisture Control on Paper Machines."

The difficulties arising from improper sheet moisture experienced on paper machines, according to Mr. Ehrisman, include variation in finish, bulk and density; blackening; cockles, puckers and graining surface; excessive number of breaks at dry end of machine and static electricity. To these he added—blackening of sheet in supercalendering, development of curl, buckle and wavy edges, poor strength properties, large sheet dimensional change due to shrink or stretch, poor coating on printing surfaces and other difficulties arising from those already mentioned—as difficulties that may develop in the processing department and in the printing plant because of the moisture problem.

Mr. Ehrisman also pointed out that strength characteristics of paper vary with moisture content; that paper moisture content reacts in a large degree to changes in relative humidity and appreciably less to the temperature of the surrounding air; that as paper dries from the wet state, its dimensions change very rapidly until reaching approxi-

mately 60 per cent humidity, then there is a decidedly slower change until reaching 40 per cent humidity, after which the rate again becomes very rapid; that a considerable part of paper curling difficulties is due to overdrying and then allowing the paper to regain moisture by exposure to a normal relative humidity; that different grades of paper require widely different moisture contents for equilibrium with identical humidity conditions; that each filler material has its own characteristic moisture holding capacity; and that continuous precision measurement of the moisture content of the paper as it comes off the paper machine is effected by the Foxboro Verigraph Moisture Control which also automatically regulates the steam to the dryers, thus keeping the moisture at the proper point.

After explaining the principle of operation of the Control, Mr. Ehrisman presented data showing results obtained with it. In one case, moisture variation throughout a 24-hour period was shown to be maintained generally within 0.25 of one per cent. Likewise, attention was called to the rapid response of the instrument to moisture changes—a response most apparent at a paper break when the exposure of the hygrometer of the instrument causes it to measure the relative humidity of the room.

Mr. Ehrisman concluded his paper by stating that accurate moisture control on paper machines will result in higher sheet moistures, reduced manufacturing difficulties and reduced steam consumption.

### Preparation of Coating Color

The second paper before the Book, Fine Papers, Coating Group meeting was the subject of E. G. Milham, of the Watervliet Paper Company. It was entitled "Developments in the Preparation of Coating Color Mixtures."

Mr. Milham divided the preparation of coating color into seven phases: namely, preparation of adhesive; wetting out dry pigments; mixing adhesive and wetted pigment; incorporation of tinting materials; introduction of special chemicals; straining; and supermixing or jordaning. Then he proceeded to explain each of these seven phases in detail.

Casein and specially treated starches were said to be the most important adhesives used in the coated paper industry.

The preparation of treated starches, said Mr. Milham, consists of stirring the starch with the desired quantity of cold water and subsequently heating it with direct steam to 180 deg. to 200 deg. Fahr. and cooling it back to about 90 deg. Fahr. by the addition of more cold water.

In discussing the preparation of casein, Mr. Milham stressed the undesirability of excessively fine grinding and suggested that a properly ground casein should all pass a 10-mesh screen and that not more than 10 per cent of it should be fine enough to pass a 40-mesh screen. The need for thorough soaking of the casein with water prior to the addition of the cutting chemical was touched upon and a list of the most important cutting chemicals given. This list included soda ash, caustic soda, ammonia, borax, tri-sodium-phosphate, silicate of soda and bicarbonate of soda.

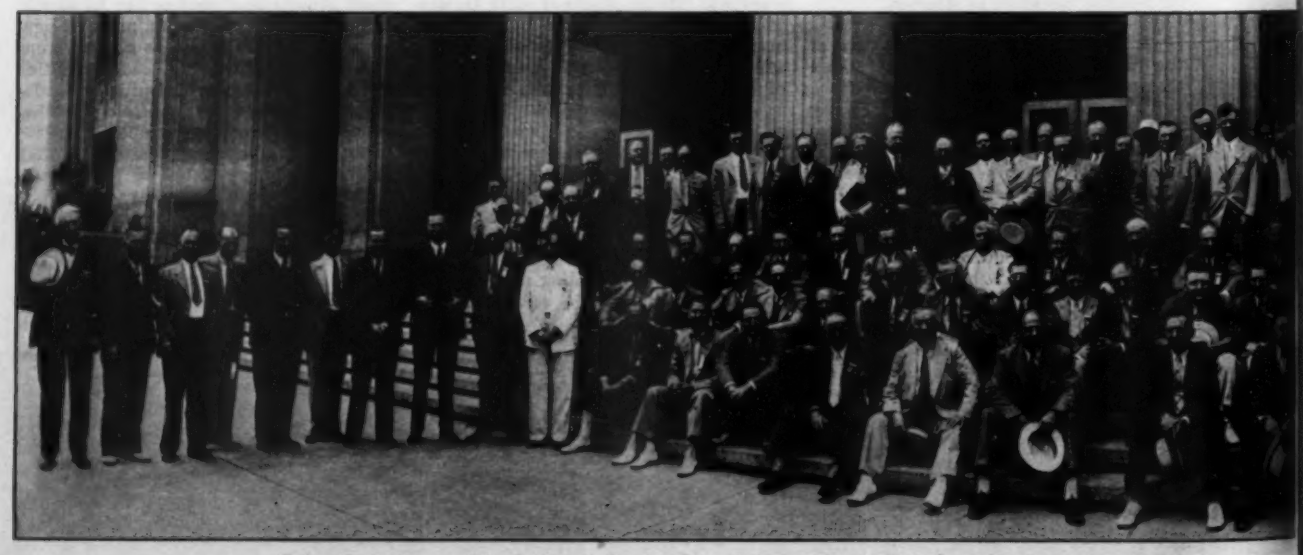
A good standard formula, said Mr. Milham, consists of 100 lb. dry casein, 8 lb. soda ash and one gallon of commercial 26 deg. ammonia, along with 400 lb. of water. At this concentration, he continued, the addition of the cutting chemical causes the mixture to become very thick and it is usually necessary to warm it up to about 140 deg. Fahr. to facilitate complete cutting—after cutting it is advisable to cool the mixture back to about 90 deg. Fahr.

Mr. Milham mentioned the advisability of wetting out thoroughly dry pigments before bringing them in contact with casein mixture; and stated that the pebble mill is probably the best method ever devised for bringing the pigment into intimate contact with the adhesive. He classified tinting materials as water soluble dyes, dry, dispersable pigments and paste pigments, and stated that after the color has been dissolved or dispersed, it should be strained through a fine wire cloth to eliminate the possibility of color specks.

In discussing the introduction of special chemicals, Mr. Milham referred to the need for adding levelling agents or de-foamers to the coating mixture to assure a free flowing color and the absence of fat spots and pin holes in the finished paper. He said that the most satisfactory levelling agents are made from vegetable oils, such as castor oil, and that they should be added after the coating has been strained and then in dilute form (not over 20 per cent of full strength). He also mentioned that the diluting water should be sufficiently alkaline to keep the oil from breaking down. Mr. Milham likewise called attention to the use of lime water or formaldehyde as a setting agent when a waterproof coated sheet is desired.

Straining, continued Mr. Milham, is one of the most important operations in the preparation of coating color. Reference was made, in this connection, to the almost complete replacement of rotating brush sieves with centrifugal screens, shaker screens, vibrator screens, or gyratory strainers.

The outstanding development in color preparation during the past year, remarked Mr. Milham, has been the introduction of colloid mills, dispersers and the color jordan. He made direct reference to the Lancaster disperser and to the Crane color jordan; and suggested that the success of both of these machines lies largely in the fact that they are carefully designed to avoid possibility of air entering the system—a feature which permits extremely violent agitation without making the coating foamy or fluffy.



Delegates to the annual meeting of the American Pulp and Paper Mill Superintendents Association

### TISSUE GROUP FORUM

The Tissue Group meeting with H. H. Harrison, of Crystal Tissue Company, as chairman, was conducted as an open forum. Various methods of meeting pitch difficulties as experienced in lightweight mills were discussed. Several pulps, supposedly low in pitch, were mentioned. A special talc, tri-sodium-phosphate, Bentonite, caustic soda and antichlor were mentioned for use in the beater. Xylene, carbon tetrachloride, gasoline, coal oil, alcohol and Oakite stripper were considered for use on the wire.

Seasoning of the pulp was found beneficial by some as a method of avoiding pitch troubles. The averaging of several grades of pulp also was recommended. It likewise was felt that it is very important to keep the beaters clean.

The use of the Lampensator, a machine used abroad, was described. This machine removes the ray cells which contain the pitch in pulp.

Other subjects that came up for brief discussion covered the use of doctors on the first dryers, forming boards, and felt boxes, as well as the repairing of Yankee dryers. Some reference also was made to the general subject of drying.

#### Thursday Evening Dinner Meeting

Dr. Merton Rice, of Detroit, Mich., was the principal speaker on the dinner program of Thursday evening. In a most interesting and dynamic way he unfolded his subject, "My Country." He first reviewed something of the history of the United States previous to, during, and immediately following the Civil War. He told of the patriotic fervor of the people of the time and suggested that such names as Kenesaw Mountain Landis and S. S. B. (Star Spangled Banner) were evidence of that fervor. He said that it was necessary for us to get a positive expression for that for which we stand.

Most emphatically he declared that he loved America because it is a big, growing country; because it is unfinished; because it is rich; and because it is opportune. He referred to a number of Detroit's industrial leaders as the bench workers of yesterday and the employers of today and suggested that what was true of these men was true of other men the country over.

Just previous to the address of Dr. Rice, a musical selection was rendered by Geraldine Te Pastte, the 13-year-old violinist who was a star on the recent Grand Rapids night program of Major Bowes. Major Bowes also was informed by telegram that he had been made an honorary member of the Chinese Paper Makers Group and that the star of his Grand Rapids radio hour program was the star on the banquet program of the evening.

### Friday Sessions

The Friday sessions, the last day of the convention, included a general session in the morning, annual business meeting directly after luncheon, general conference for most of the remainder of the afternoon, and a banquet in the evening. President Charles Champion presided at each of the several sessions.

Two papers were presented at the general session of the morning. One of them was presented by Grover Keeth of Marathon Paper Mills Co., and the other by W. G. Schlicting of the Clarage Fan Co.

#### Report on Safety Conference

The subject of Mr. Keeth's paper was "Report of Trip to National Safety Conference." In this paper, Mr. Keeth reported on the annual meeting of the National Safety Congress that was held last October in Louisville. He stated in part that the Louisville convention was the largest ever held by the National Safety Congress; that at the first session a resolution was passed regarding the passing of "Herb" Banta (Cf. THE PAPER INDUSTRY, 17, No. 8, p. 577, 1935); and that during the year ending with the convention a strenuous effort was made to secure data on accidents by means of reports which pass through the Experience Exchange.

Reference was made to the papers read at the conference by D. B. Chant, of the Ontario Pulp and Paper Makers' Association; M. W. Dunmore, of Beloit Iron Works; W. J. Peacock, then head of the Personnel Department of Northern Paper Mills; J. M. Conway, of Hoberg Paper & Fibre Company, and Clyde Ferrell, of the Mead Corporation. Mr. Keeth repeated the suggestion that was made in answer to a question brought up in round table discussion at the convention relative to hazards when using a welding and cutting torch inside of tanks and unventilated places and that was to write to the American Welding Society, 33 West 39th St., New York, N. Y., for a booklet on the subject.

Brief mention likewise was made of comments relating to the effect of dust on workmen and to the subject of goggles.

Then Mr. Keeth presented a few of his own views on the safety subject. "The discouraging thing about the safety campaign so far as our mill is concerned," stated Mr. Keeth, "is that accidents are increasing." He attributed part of this rise to the mill going on to four shifts and the need arising therefrom of new men getting acquainted. He referred to some of his earlier experiences in shop work before any one heard of a safety campaign and ventured to assert that he did not believe there were any more accidents then than today. In struggling to find the answer to the elimination of accidents, he said that he has come to the conclusion that the cause for most of them is in our minds. To this end, he recommended in his concluding remarks that the place to begin the safety campaign is in teaching the children at home to obey—in other words, education—first, last, and all of the time.

in front of the Grand Rapids Civic Auditorium where the exhibit and some of the sessions were held

**Air Conditioning**

Mr. Schlicting's paper was entitled "Air Conditioning of Paper and Printing Plants." In this paper, the speaker called attention to the behavior of paper when exposed to the air. He stated that, as paper absorbs moisture, the individual fibers swell more in diameter than they do in length; that this phenomenon causes a sheet to increase or stretch in width (the direction perpendicular to the fibers) a greater amount than it increases in length (the direction parallel to the fibers); that paper will curl when the two sides of a sheet expand or contract unequally; that wavy edges will occur when a pile of low moisture content paper is exposed to high humidity; that edges will contract causing a bulge if paper of a high humidity content is exposed in piles to a low humidity; that moderately high moisture content increases the folding endurance of a paper; that low moisture content decreases the conductivity of a paper and permits it to store an electrical charge; that, by keeping humidities above 45 per cent, the conductivity of paper is increased to such a point that charges are less easily generated by the paper and are grounded; and that high moisture content in a paper retards absorption and causes spreading of an ink, while paper that is too dry will cause too rapid an absorption and penetration.

Troubles in a press room which are traceable to atmosphere conditions, according to Mr. Schlicting, occur at times when humidity is too high or low, when humidity is permitted to vary, or when temperature is too low. When humidities are kept at 45 per cent or over, he said, difficulties from static are usually eliminated without the aid of neutralizers and faster press speeds can be employed.

Poor register, he continued, is most commonly caused by the sheet changing dimensions between runs. Best press room operation, said Mr. Schlicting, has been experienced with temperatures between 70 and 75 deg. Fahr. and corresponding relative humidities of 45 to 50 per cent.

In concluding his paper, Mr. Schlicting suggested that the co-operation of the paper manufacturer in controlling moisture content in paper shipped by him to a percentage corresponding with optimum press room humidity and the wholesaler in controlling the atmosphere in his warehouse so that the moisture content of the paper will not change while in his keeping will be mutually beneficial to all parties.

**Officers Elected**

At the annual business meeting following the luncheon of Friday afternoon, the following slate of officers was elected by unanimous ballot:

*President*—F. J. Timmerman, of Northern Paper Mills, Green Bay, Wis.

*First Vice-President*—B. D. Millidge, of Howard Smith Paper Mills, Cornwall, Ont., Canada.

*Second Vice-President*—F. L. Zellers, of French Paper Co., Niles, Mich.

*Third Vice-President*—H. H. Harrison, of Crystal Tissue Co., Middletown, Ohio.

*Fourth Vice-President*—A. B. C. Drew, of the Pairpoint Corp., New Bedford, Mass.

*Fifth Vice-President*—Oscar Stamets, of Riegel Paper Corp., Riegelsville, N. J.

After approving several resolutions drawn up by the resolutions committee, the business session of the afternoon was adjourned and the geenral conference opened immediately afterward.

**General Conference Session**

Carl E. Whitney, Counsel for the American Paper and Pulp Association, was the first speaker at this general conference. He reviewed some of the work of the American Paper and Pulp Association's committee on public affairs, and asked for the co-operation of every one present who was interested in any way with the papermaking industry of the United States.

**"Uncle Jake" Reminisces**

Following the completion of Mr. Whitney's remarks, Jacob Kindleberger, Chairman of the Board, Kalamazoo Vegetable Parchment Company, was introduced and he spoke most interestingly on some of his early experiences in the paper business and upon some of his recent experiences in visiting paper mills in South America.

In reminiscing, Mr. Kindleberger recalled the old days at West Carrolton, Ohio. He named some of the men who were there with him; described their blacksmith shop meeting place and their frequent meetings; and said that from them he had learned a great deal. He said that a lot of horse sense was taught in those meetings and that that is the need of the hour today.

The crowd that made up the meetings of the "old convention days," said Mr. Kindleberger, consisted of progressives and standpatters, the progressives, of course, being in the minority. Those meetings, he continued, were experience meetings and from them it was possible to sort out the chaff from the wheat.

Improvements in the paper industry, he said, will continue until time shall be no more. He declared that there is a great future for the paper business, and intimated that when a man gets to a point that he is through changing, he is through.

He referred to the need for getting fun out of work; and mentioned some of the romance that he has been able to see in it through the lives of some of the old-timers. One of these old-timers was most successful in his handling of men and Mr. Kindleberger attributed this success to first of all his being a real human being and then to his sense of justice.

Another old time superintendent to whom he referred saw to it that things were fixed before anything went wrong —simply profiting by the old adage that "a stitch in time saves nine." Mr. Kindleberger said that this man made sure everything that ought to be was; that he looked first before he leaped; and that he was great on cleanliness and order.

This old time teaching of men, said Mr. Kindleberger, is the need of the hour. He next deplored the extravagance of today; stated that more frugality was needed; and suggested that the time has arrived to have a school in the average mill for the training of men.

Mr. Kindleberger then gave some of his impressions gained from his recent trip to South America. He mentioned that on this trip he visited 18 mills in the Argentine and 22 in Brazil. The Argentine mills, he said, were operated by Italians, while Germans operated the mills in Brazil. He remarked that the paper machines in all of the mills were bought from one concern in Belgium; mentioned that each of these mills was winding its paper on square cores; and stated that only one of them was using a jordan—the rest of them using the kollergang.

Mr. Kindleberger's closing remark was to go home and improve the way of doing things.

**Banquet Is Grand Finale of Convention**

The banquet program of Friday evening proved to be a marvelous grand finale for a most excellent convention. It started off with an announcement by F. L. Zellers in which he stated that the registered attendance at the convention totaled 776 and the non-registered 146. Immediately following this announcement, Fred Boyce of Wausau, Wis., and first president of the association, had the pleasant duty of announcing that Michael Redmond, of the Kalamazoo Paper Company, had been made an honorary past president of the association. This honor set a precedent as Mr. Redmond never filled the chair as president. Nevertheless, he was a vice president of the association for a number of years and ever since he became a member of the association he has been interested in its affairs. This honor, therefore, was well-deserved and it received the acclaim through whole hearted applause of what seemed to be the entire attendance at the banquet as soon as the announcement was made by Mr. Boyce.

At this point in the program, Mr. Zellers thanked each member of his committee for his individual co-operation and help in arranging for and putting over the convention. Most certainly Mr. Zellers and his committee did an excellent job and words of commendation would in no way be amiss.

Francis D. Bowman, of the Carborundum Company, who said he was representing the women of the convention, then proceeded to present an individual gift to both Mrs. Dan Stacey and to Mrs. Marie J. Cady as a token of appreciation of the ladies for the royal way that they had been entertained. This presentation of gifts was followed by the presentation of the L. D. Post trophy, a Hamilton watch, to Charles Champion, retiring president of the association. The presentation was made by John Cornell of *The Paper Mill and Wood*

*Pulp News*, the donor of the trophy.

Charles W. Newcomb, of Delaware, Ohio, was the speaker of the evening, and after an introduction by Mr. Bowman, he proceeded through the use of many interesting stories, a humor that was contagious, and a philosophy that got down to bed-rock to reveal his thoughts on "What Are You Afraid Of?" Fear, he said, in one way or another has much to do with success. He mentioned and elucidated upon the fear of accident and disease, the fear of loss, the fear of displeasure of the group, the fear of failure, and the fear of the unknown. Mr. Newcomb made it clear that knowledge and faith were the correctives for fear. He defined the brave man as the man who goes ahead even though afraid; measured individual courage by the statement that the measure of your courage is the measure of your fear; and gave credence and support to the thought that "the answers to all your problems are within."

The remainder of the program was given over to an entertainment feature that had been staged by Mr. Bowman. It is doubted if ever before was presented such a quality entertainment program before a convention of the American Pulp and Paper Mill Superintendents Association, although some of the former programs had been very good. Mr. Bowman certainly demonstrated his showmanship; and with the close of his very entertaining program of dancing, singing and magic ended the 17th Annual Convention of the American Pulp and Paper Mill Superintendents Association.

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## ◆ Copeland Made President of Northwest Paper Co.

Officials of The Northwest Paper Company of Cloquet, Minnesota, announce that Mr. Stuart B. Copeland, well-known figure in the paper and pulp industry, has accepted their offer of the position of president. It is expected that he will take over his new duties at Cloquet shortly after the first of September.

Mr. Copeland, formerly of the Eastern Manufacturing Company, Bangor, Maine, served as vice-president and general manager of that organization and since 1917 was in charge of all operations. He has been active in the industry and at present is a member of the Executive Committee of the American Paper and Pulp Association and president of the United States Pulp Producers' Association, an office which he has held since its organization in May, 1933.

Mr. Copeland was born in Davenport, Iowa, in 1889. He spent most of his early life in Wisconsin where his father, George E. Copeland, was superintendent of agencies of the Northwestern Mutual Life Insurance Company, Milwaukee.

After attending the Massachusetts Institute of Technology, from which he graduated in 1911, Mr. Copeland entered the pulp and paper business in accepting a position with the Katahdin Pulp and Paper Company at Lincoln, Maine. Working up through the various departments of this mill, Mr. Copeland held the position of assistant general manager when, in 1914, that organization was absorbed by the Eastern Manufacturing Company.

Mr. Copeland was elected vice-president in charge of manufacturing late in 1917, after which he was put in charge of all operations. He continued in this capacity until 1928 when there was a complete change in management. Since then, he has served as a director, in addition to being vice-president and general manager. Mr. Copeland has always been active in industry affairs.

**Stuart B. Copeland**

His early work included serving as chairman of the Stream Purification Committee of the American Paper and Pulp Association.

In the fall of 1931, Mr. Copeland was spokesman for the industry in its efforts to secure relief through federal legislation from unfair foreign competition during the so-called "depreciated currency" period. During the N.R.A., he was active in the preparation of the Pulp Industry Code and served as chief administrative officer of the Code in the capacity of chairman of Pulp Executive Authority. Also, he was active in preparing the Pulp and Paper Industry Code and was a member of the administering body, The Paper Industry Authority. Prior to the N.R.A. code period, he was a member of the executive committee of the Writing Paper Manufacturers' Association. Again in the writing paper industry, he aided in the preparation of the code and served as a member of the administrative body, The Writing Paper Executive Authority, until February, 1934, when he was obliged to resign because of the pressure of other activities.

The Northwest Paper Company, Cloquet, Minnesota, was formed on May 2, 1898. Operating mills at Cloquet and Brainerd, Minnesota, it produces about 150 tons daily. The company makes its own pulp and manufactures coarse, converting and fine papers.

## ◆ Sulphate Mills Require No Purchased Fuel

Purchase of fuel and electric energy by sulphate pulp and paper mills is unnecessary, according to V. D. Simons, 435 North Michigan Ave., Chicago.

Mr. Simons makes this remarkable statement after more than thirty years of consulting engineering experience within the pulp and paper industry.

This experience began with some early electrification work within the industry, work dating back to 1903, and ever since then Mr. Simons has been contributing to the advances being made by the industry in the more efficient generation and utilization of power. He also has been responsible for the design and construction of some of the industry's most outstanding mills, a number of which are among the more prominent mills on the Pacific Coast. Mr. Simons, likewise, has been active in the modernization efforts of a number of older mills.

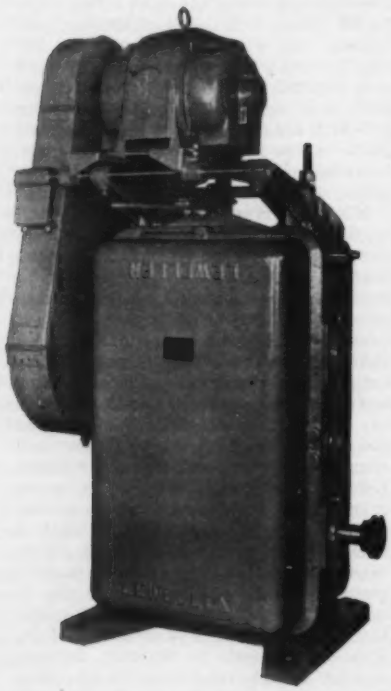
All of this work has kept him in touch with technological improvements within the industry and within the engineering field in general. It has allowed him to accumulate a vast fund of engineering data which upon analysis now makes it possible for him to make the statement that no purchased fuel is required by sulphate pulp and paper plants if they are equipped to utilize to best advantage the energy that is available to them in the solids of the black liquor and through a reduction of steam and power requirements elsewhere. Steam economies, states Mr. Simons, can be accomplished through altering the process of multistage evaporation, through evaporation of black liquor to dryness and its resulting heat economy over a one to one ratio of evaporation in the furnace, through maintenance of proper temperature of chemicals to digester, through use of a high concentration of white liquor and maximum amount of black liquor per digester charge, through thorough washing of pulp with minimum amount of water, through reclamation of condensate from evaporator at temperatures wherein further use can be made of the heat for other purposes, through use of heat in condensate in machine room, through economical drying on paper machines, and through reclamation of flash steam from blow to heat wash water.

The combination of these economies with proper boiler and turbine cycle to generate required power and to furnish process steam will permit the average mill, comments Mr. Simons, to provide more than 1000 kilowatt hours for each ton of pulp produced.

◆ GEORGE BOISVERT, woodlands manager of the Ontario Paper Company, subsidiary of The Tribune Company, passed away in Montreal, June 29, at the age of 47. Mr. Boisvert was advanced to the position as manager of the company's large woodlands holdings because of his thorough knowledge of timberlands. He was a graduate of the school of forestry of Laval University in Quebec.

### ◆ New Type of Variable Speed Unit

Lewellen Manufacturing Company, Columbus, Ind., has announced a new type of variable speed unit in which an extended lever is positioned between the driving motor mounting and the enclosed Lewellen transmission. This lever lies close to the transmission and may extend in any direction. It is applied to both the open and enclosed construction transmission and in both horizontal and vertical types. This method of control



speed is applicable for either automatic or manual operation by connecting the extended lever with any movable machine element, so that for any position a definite speed is obtained. The range of speed variation of the transmission is changed by simply resetting the stop for a new drive belt.

### ◆ New Industrial Photo-Cell Control Unit

A new photo-electric control unit in which sensitivity and operating speed have been doubled, and which is said to be highly dependable even under difficult service conditions, has been introduced by the Weston Electrical Instrument Corporation, Newark, N. J. It is applicable to a wide range of industrial control purposes in which interruption of a light beam conveniently provides the initial impulse for opening or closing an electrical circuit, such as counting, sorting and weighing devices, automatic processing control, safety cut-offs, alarm warnings and the like.

The assembly consists of a Weston photo-cell of high output characteristics in a protective mounting, the complete relay unit in a separate panel box, as well as a light source of standard design. A light intensity of 100 foot-candles falling on the cell provides adequate energy for positive operation of the relay system in contrast to the 200 foot-candle level formerly required. Output capacity of the new relay is 500 watts, so that most installations can be handled directly by the relay contacts without the use of external contactors.

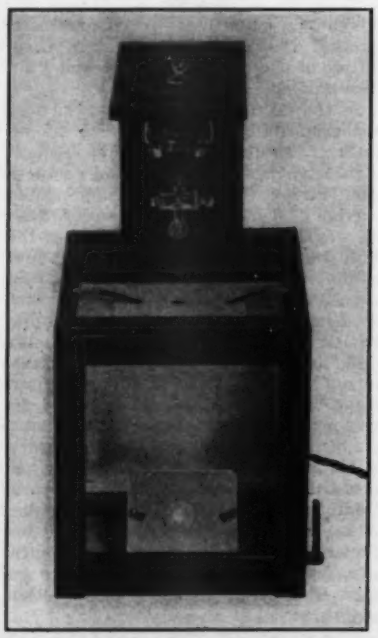
The relay is arranged for single-pole, double-throw operation, with an overall speed of response of 0.15 seconds. Positive action of the relay at speeds up to 400 operations per minute permits automatic control of high speed industrial processes for which previous units of this type were unapplicable.

A particularly useful feature of the panel assembly of the new unit is the microammeter calibrated in light units, which has been included to show the level of illumination reaching the photo-cell. The meter forestalls the possibility of operating difficulties resulting from failure to maintain the light on the cell at an adequate level.

As in former units, the Weston photo-cell generates sufficient electrical energy directly from the light energy to operate the relay without external amplifying tubes or other current supply to the cell. The cell and relay panel may be mounted at different locations as required.

### ◆ Oil Penetration Tester

An instrument designated as the Fuess oil penetration tester and patterned after an instrument developed by the Government Printing Office at Washington has been announced by R. Fuess, Inc., 245 West 55th Street, New York, as a means to determine ink receptivity of paper, particularly news and magazine. The instrument allows the reflection of a drop of castor oil on a test sample of paper to be observed in an illuminated mirror, a stop-watch being used to determine the time required for the drop to saturate the sheet.



The instrument complete with 110 volt light, operating A. C. or D. C. current, is mounted in a cabinet of solid walnut. The light source, which illuminates the reflection of the drop on the mirror, is contained in back of a ground glass diffusing screen. A drop funnel, polariscope tested for strain and with accurately fitting pet-cock, serves as a reservoir for the castor oil and permits only one drop of it to escape at a time.

### ◆ Diaphragm Valve Motor Line Redesigned

Taylor Instrument Companies, Rochester, N. Y., has completely redesigned its line of MOTOSTEEL diaphragm valve motors. According to an announcement, the redesigned line is the first to employ an all-steel welded construction. This construction is lighter in weight, stronger, and has greater resistance to shocks and strains than the cast iron type.

A larger molded diaphragm of advanced design insures a smoother, quicker-acting and more powerful valve motor. Formed impressions in the top plate provide freer access of air pressure to the diaphragm in starting. A longer and larger diameter spring gives greater initial compression, less hysteresis and more accurate response; while a ball-bearing, roller-bearing stem guide insures a free rolling action throughout the entire stroke.

Spring and spring adjusting nut, as well as other moving parts, are full enclosed, but are readily accessible for adjustment or maintenance by removing side plates.

All parts are treated to resist corrosion.

Valve position indicator establishes valve opening.

### ◆ New Emulsifying Base

Glyco Products Co., Inc., 148 Lafayette St., New York City, has introduced a new emulsifying base under the name of Trigamine, which is a liquid, almost white in color and with a pleasant odor. It is soluble in water, glycols, glycerine and 50 per cent alcohol. It is immiscible with organic solvents, non-hygroscopic at ordinary humidities and non-volatile up to 100 deg. C. It is suggested, among other things, as a dispersing agent for casein and shellac—a use of interest to the paper industry.

## ◆ Tantalum—a New Metal to the Paper Industry

Tantalum, a new metal to the paper industry, made its appearance at the recent convention of the American Pulp and Paper Mill Superintendents Association.

The entire production of Tantalum metal, beginning with the treatment of the ore, is carried out in the plant of the Fansteel Metallurgical Corporation in North Chicago, Illinois. The processes are highly specialized, requiring strict laboratory control.

Even if the pure Tantalum powder is obtained through the chemical processes of reduction, the remaining steps are rendered difficult because of the metal's extremely high melting point which makes it impossible to utilize ordinary metal melting operations. The metal is not fused but is produced by pressing, sintering at extremely high temperatures, hammering and swaging. As Tantalum combines readily with all common gases at elevated temperatures, it is essential that the ingots be prepared sufficiently well to be worked without the application of heat. Subsequent operations such as swaging, wire drawing, rolling sheet, and drawing seamless tubing, are done cold with vacuum annealing at suitable stages. Fabrication that requires welding, machining and hardening is accomplished by utilizing processes and techniques developed by the manufacturers.

The manufacturer makes the following claims for Tantalum:

It is a pure metal (element 73).

It is completely resistant to corrosion and chemical attack of most acids. This is particularly true of the acids of sulphite digestion.

It is resistant to the action of chlorine and bleach liquors.

It is an excellent material for heat transfer surfaces because it can be used in very thin sheets and tubes with resulting low thermal drop.

It is unchanging in its thermal properties because no product of corrosion can be formed to produce low conductivity surface films.

It is equivalent to ceramics in its resistance to chemical attack, yet can be fabricated into complicated forms.

It is capable of being welded with high pressure joints which are stronger than the parent metal.

It is uniformly resistant to chemical attack over welded and unwelded areas.

It is completely homogeneous, and it contains no impurities, which may set up a local electrolytic action.

It is capable of being drawn, stamped, hammered, formed, or welded without introducing strain areas which may become the center of local action.

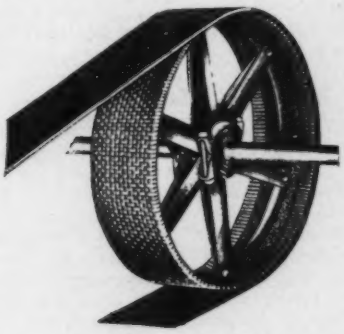
It is capable of being hardened through a wide range without losing any resistance through chemical attack.

It cannot be cast nor handled as a chrome nickel alloy, ordinarily used in sulphite work, yet it can be so fabricated to cover parts that it will afford full protection to the surface involved. The fact that it can be hardened without impairing its corrosion resistance properties opens up a wide field of application.

Tantalum applications in bleaching plants seem to present an unlimited field—needle valves, nozzles, sleeves for acid pumps, laboratory agitators, production agitators, pump parts, temperature control devices, injectors, etc. Since it is in no way affected by chlorine, or chlorine compounds, it will not corrode, therefore, will not stain the pulp. Since it can be hardened and the fact that it is very tough, eliminates the possibility of wear experienced with other metals.

## ◆ Belt Pulley Bandage

Scann-American Sales Service, 200 Broadway, New York City, has announced the introduction of Contrasit belt pulley bandage in this country. This product is for application to pulley faces to eliminate belt slip. The bandage is of asbestos cloth that is soaked in a specially prepared liquid,



known as Contrasit and then applied tightly to pulley face without overlap. The liquid is said to be unaffected by temperature or moisture changes after application—live steam being required to remove it from a pulley if desired.

## ◆ New Instrument Transformers

Several new lines of current and potential instrument transformers, in voltage ratings of from 23 to 161 kv. and suitable for oil or Pyranol filling, have been announced by the General Electric Company. Sizes and weights have been reduced, and insulation factors increased in the new transformers.

In the new current transformers the primaries are wound on porcelain spools, which serve as the main part of the insulation between the primary and secondary circuits. The 23- and 34.5-kv. transformers each have one porcelain-spool unit; for 46 kv. and above, each transformer has two or more porcelain-spool units connected in cascade. The current transformer element is mounted in a shallow base and extends up into a porcelain shell, which is used as the high voltage bushing.

The new potential transformers are designed for use only on 3-phase, 4-wire grounded systems. They replace the single-bushing, conventional type. In the lower voltage classes, 69 kv. and below, the units consist of a single core-and-coil assembly mounted in a shallow tank and extending up into a porcelain shell which serves as the high voltage bushing. In voltages above 69 kv., the transformer consists of two or more core-and-coil units, mounted vertically and connected in cascade.

## ◆ Vertical Capstan Enclosed Car Puller

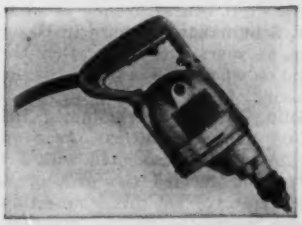
The Fridy Hoist and Machinery Co., Mountville, Pa., has developed a vertical capstan car puller that can be furnished with individual motor ratings of 7½, 10, 15 and 20 horsepower. The 7½ and 10 horsepower capstans, designated as Junior sizes, will handle a haul of 150

and 250 tons respectively on a slight grade at slow rope speed; while the 15 and 20 hp. units, designated as Heavy Duty, can handle a load of 350 and 500 tons respectively under similar conditions.

Operating parts for this type of car spotter are enclosed within a cast iron housing—the complete equipment being mounted on a steel sub-base for installing on a concrete foundation.

## ◆ Electric Drill

A new, standard duty ¼-inch electric portable drill, known as the improved OB-4 model, has been announced by Signal Electric Mfg. Co., Menominee, Mich. In this design of drill, the switch and cord are in the handle. Likewise, the handle is ventilated. In other respects, it has the same general specifi-



cations as other Signal ¼-inch standard duty drills. It is made of aluminum alloy; powered by a Signal Universal motor; and is equipped with Almond 3-jaw chuck with key, special alloy heat-treated gears, and with eight feet of heavy duty rubber-covered cord and rubber plug. The no-load speed of the drill is 1700 r.p.m.

### ◆ Dr. West Goes to Institute

Dr. Clarence J. West, Director, Research Information Service, National Research Council, has accepted appointment as Technical Editor of the Institute of Paper Chemistry affiliated with Lawrence College at Appleton, Wis. Dr. West, who has held his present post since 1925, will be in full charge of all publications, bibliographies, and preliminary researches at the Institute.

Dr. West has been editor of the *Annual Survey of American Chemistry*, published each year in book form by the National Research Council, since becoming director of its research service. He began his career as research chemist for the Rockefeller Institute after taking his Doctor's degree at the University of Michigan. During the War, he was made major in the Chemical Warfare Service, and is now a Lt.-Col. in the reserve of that branch. While on active service he prepared a series of 25 monographs on chemical warfare, and is coauthor, with Brig. Gen. A. A. Fries, of the only text on that subject.

For two years Dr. West was director of the information service of Arthur D. Little Co., consulting and manufacturing chemists. He has also been associate editor of Chemical Abstracts, and a contributing editor of Paper. He is chairman of the Committee on Abstracts and Bibliography of the Technical Association of the Pulp and Paper Industry.

His publications include *Bibliography of Paper Making, 1920-28; Reading List on Paper Making Materials; Classification and Definition of Paper; Bibliography of Bibliographies on Chemistry and Chemical Technology, 1900-1928; Handbook of Scientific and Industrial Societies and Institutions in the United States;* and *List of Industrial Research Laboratories in the U. S.* Periodical publications include numerous special bibliographies in the *Paper Trade Journal*, pamphlets, and articles.

Dr. West will assume his duties at Appleton on July 15. He will be the first to hold the post of Technical Editor at the Institute of Paper Chemistry.

### ◆ John S. Schumaker

John S. Schumaker, production engineer of the Champion Fibre Company, Canton, N. C., passed away June 16 after a short illness.

Mr. Schumaker was born in Hartford, Conn., 58 years ago. His father having passed on when he was just a boy, it was necessary for him to plan his own schooling which he completed in the face of many difficulties. As a young man he became associated with Joseph Santry and formed the firm of Schumaker-Santry. In this connection he became interested in the manufacture of paper which brought him into the capacity of a consulting engineer for the industry. He made a number of inventions that are now in use in paper and pulp mills.

In 1927, Mr. Schumaker became associated with the Champion Fibre Company as production engineer, which position he has held since that time.

Mr. Schumaker was a member of many engineering bodies. He was appointed by the A. S. M. E. as a member of a committee to revise its boiler code, to which specifications all boilers in the United States are built. He was a member of the American Society of Civil Engineers, the American Society of Electrical Engineers of the Cumberland Institute of Paper Perfection and of the Technical Association of the Pulp and Paper Industry.

Surviving Mr. Schumaker are his widow, three daughters and two sons.

### ◆ Shartle Expands to Meet Increased Demand

In 1906, Shartle Brothers Division of Black-Clawson Company built the first unit of its present shop. This unit has 11,200 sq. ft. of floor space. In 1913, additional space of 8,000 sq. ft. was added; in 1923, there was another addition of 40,968 sq. ft. Now the company has added 12,800 sq. ft.

In other words, since 1906, Shartle Brothers Division has increased its floor space more than five and one-half times.

### ◆ Herbert E. Harmon

Herbert E. Harmon, secretary of Knowlton Brothers, Inc., Watertown, N. Y., passed away at his home June 18 following a short illness. He was 82 years of age.

When Knowlton Brothers was incorporated nearly fifty years ago, Mr. Harmon was one of the incorporators. He was first plant manager, then was promoted to the office of secretary.

Mr. Harmon was one of the original partners in the Harmon Machine Company, the company that manufactured the Harmon pulp screen until a few years ago when it discontinued business and sold its interest and good will to Bagley & Sewall Company. Early in his career, Mr. Harmon was president of the old Harmon Paper Company at Brownville.

Mr. Harmon's was one of the most widely known figures in the allied field and his interests both in business and social life were many. He was active in local civic affairs and was connected with the directorate and management of a number of institutions.

Surviving are the widow, a daughter and a brother.

### ◆ Hercules to Manufacture Cellulose Acetate

Negotiations have just been completed between Hercules Powder Company, of Wilmington, Delaware, and the I. G. Farbenindustrie Aktiengesellschaft, of Frankfurt, Germany, by which Hercules comes into control of the American patents covering the I. G. processes on manufacturing cellulose acetate.

M. G. Milliken, general manager of the Cellulose Products Department, stated that Hercules expects to be in quantity production of flake cellulose acetate by this December. The experimental and pilot units at the company's extensive cellulose products plant at Parlin, N. J., have been running successfully for several years and a material of high quality with improved properties is being produced.

Work on the new large-scale plant is progressing. In its construction, the most modern units of equipment are being installed throughout so that economical operations and high quality will be assured.

### ◆ Patterson Takes Over Grinder and Mixer Business

Richard L. Cawood, president of The Patterson Foundry & Machine Company, manufacturers of grinding and mixing machinery at East Liverpool, Ohio, has announced the purchase of the ball or mushroom grinder and mixer business of the A. & F. Brown Company of New York.

The complete line of ball grinders and mixers will now be manufactured at the main factory of the Patterson Company at East Liverpool, Ohio.

### ◆ T.A.P.P.I. Fiber Symposium at Appleton

During the period from June 9 to 18 about thirty members of the Technical Association of the Pulp and Paper Industry skilled in fiber identification work, met at the Institute of Paper Chemistry, Appleton, Wis., for a symposium, round table dicussion and laboratory work dealing with pulp fiber identification and estimation.

The first week was devoted to a series of lectures, demonstrations and laboratory experiments on the techniques involved in the preparation of slides for fiber work, in the staining of various fibers by the "C" stain and others developed by John Graff of the Institute, and finally in the count method for evaluating the fiber composition of the slides. Eight specially prepared suspensions of fibers were investigated by the group, using methods ordinarily followed. Later the new stains were used to demonstrate their relative efficiencies.

The second week was devoted to a round table discussion on the identification and estimation of fibers. A special committee consisting of John Calkin, Chairman; F. C. Clark, R. H. Simmons, M. A. Youtz, G. K. Spence, R. W. McKinley and C. E. Peterson and John Graff, met for the purpose of rewriting the T.A.P.P.I. Standard T 401 m (Fiber Composition of Paper) in the light of the results of the co-operative work of the group present. The existing method was greatly improved and the new technique involving the use of the "C" stain was written into a new proposed tentative standard which was approved by the group present and has been referred to the Microscopical Methods Subcommittee of the Paper Testing Committee of the Technical Association.

To commemorate the 75th anniversary of the birth of Geheimrath Wilhelm Herzberg, Mr. Graff presented an inter-

esting review of his life and accomplishments and the group voted to send him a cable congratulating him on his anniversary. He is located in Potsdam, Germany.

Mr. Graff read an interesting paper on the history of fiber identification and pointed out that nearly all of the procedures that are being followed and are considered modern were really copies of or improvements on procedures known many years ago.

Following the symposium on Tuesday evening, June 16, the group tendered a testimonial dinner to Mr. Graff in recognition of his enthusiastic and unselfish efforts in instructing the group in the short time that was available for this purpose.

### ◆ Chas. G. Paine Succeeds Copeland at Eastern

Charles G. Paine, who has been a member of the organization of Eastern Mfg. Company, Bangor, Maine, for twenty years, and its assistant general manager for the past six years, has been selected to succeed Stuart B. Copeland as vice president and general manager of the company.

Geo. P. Lee, sales manager at the company's general office in New York, has been advanced to vice president in charge of sales. Mr. Lee has been connected with the company's sales organization for the past fourteen years.

### ◆ Morris E. Leeds Honored

Morris E. Leeds, president of Leeds & Northrup Company, Philadelphia, was the recipient this year of the Henry Laurence Gantt Gold Medal awarded annually by the Institute of Management "for distinguished achievement in industrial management as a service to the community." The medal was presented to Mr. Leeds at a dinner given by the Institute and the American Management Association on June 14 and the presentation was made by Henry S. Dennison, who received the award in 1932.

Almost coincidentally, Mr. Leeds received another honor when the Polytechnic Institute of Brooklyn recently made him Doctor of Engineering.

### ◆ Executives Inspect New Institute Buildings

The executive conferences at the Institute of Paper Chemistry, on the campus of Lawrence College, Appleton, Wis., were attended by almost 100 principal officers and representatives of the Paper and Pulp association on June 5 and 6. The new $100,000 additions to the original Institute building were formally opened by the conference. Friday morning was spent inspecting the new and old quarters, and viewing a demonstration of growth of the institution prepared in graphic form.

Friday afternoon was given up to a series of brief presentations by Institute officers. Dr. Harry F. Lewis, Dean; Dr. Otto Kress, Technical Director; Dr. Ben W. Rowland, Research Associate, and Mr. Westbrook Steele, Executive Secretary, explained various phases of Institute activities, after which D. C. Everest, Vice President of the board of trustees of the Institute, and of Marathon Paper Co., Rothschild, Wis., led a round-table discussion in which executives attending the conference and Institute officers took part.

Dr. Henry M. Wriston, Director, and President of Lawrence College, was speaker at the dinner Friday evening.

### ◆ H. P. Carruth New Gen. Mgr. of Brown Co.

On July 1, Henry P. Carruth, former president of Dill & Collins, Inc., and a vice president of The Mead Corporation, became the new general manager of Brown Company, Berlin, N. H.

Mr. Carruth is one of the outstanding paper mill executives in this country. After completing his college work at

Henry P. Carruth

The Massachusetts Institute of Technology, he became affiliated with the American Writing Paper Company, Holyoke, Mass., as chief chemist. He left there to become assistant to the president of the Mead Pulp Company and in the spring of 1919 he was made general manager of the company's Chillicothe plant.

Mr. Carruth was a chartered member of the Technical Association of the Pulp and Paper Industry and served as the third president of this organization for two years.

In 1923 Mr. Carruth was made a director of the Mead Pulp and Paper Company, and in January, 1929, was elected to the office of vice president, along with his duties as general manager of the various plants making up the company.

With the formation of The Mead Corporation, in 1930, Mr. Carruth became executive vice president, which position he retained until 1935, when it was decided to eliminate the title of executive vice president from the company's organization, whereupon he became vice president.

In 1933 he became a director of Dill & Collins Inc., and in 1934 its president.

For the past two years he has been a trustee of the Institute of Paper Chemistry at Appleton, Wisconsin.

### ◆ Alligator Steel Belt Lacing Available in Special Lengths

The Flexible Steel Lacing Co., 4607-31 Lexington St., Chicago, announces that special lengths of Alligator steel belt lacing are now available.

The nine larger sizes from numbers 15 to 75 are listed in lengths from 14 in. to 96 in. The lacing is packed carefully, complete with hinge pins and handle gauge pin. The familiar sectional rocker hinge pin is supplied for power transmission installations, but a one-piece corrugated hinge pin is used on conveyor belts.

As in standard boxes of Alligator steel belt lacing, the special lengths are also available in Monel metal and non-sparking and non-magnetic alloys.

### ◆ Syndicate Takes Over Tomahawk Mills

The properties, assets and machinery of the Tomahawk Pulp and Paper Company, Tomahawk, Wisconsin, have been sold to a syndicate composed of Paul J. Schrader, Harry Harris, and others of Chicago.

The purchasers plan to rehabilitate the mills and put them into operation. Mr. Schrader, who negotiated the purchase agreement with the trustee in bankruptcy on June 4, 1935, states that plans for a permanent organization are not as yet completed.

### ◆ Oscar B. Ingall

Oscar Benjamin Ingall, superintendent of the Pejepscot Paper Company mill at Pejepscot, Me., passed away June 13 following an illness of two weeks. He was 60 years of age.

Mr. Ingall was born at Gardiner, Me., March 13, 1876. His early life was spent in Gardiner, Me., South Braintree, Mass., Niagara Falls, N. Y., and Topsham, Me. He had been employed by The Pejepscot Company 40 years, working up through the ranks to become superintendent of the Pejepscot mill in 1916.

Mr. Ingall was chairman of The New England Div. American Pulp & Paper Mill Superintendents Association in 1935.

Besides his widow, Mrs. Bertha Ingall, the deceased is survived by his mother, Mrs. Sarah Cooke.

### ◆ Harry Frost Made Sales Manager of Sinclair

Harry Frost has been appointed sales manager for The Sinclair Company, Holyoke, Mass., and will be in charge of all sales for the three products of the company—fourdrinier wires, dandy rolls and cylinder molds.

## ◆ New Catalogues and Publications

**Allis-Chalmers Mfg. Co.,** Milwaukee, Wis.—This company has issued a new leaflet, No. 2224, on its single-suction and inlet centrifugal pumps, mounted on substantial pedestals, and used with direct-connected or with Texrope V-belt drives. In addition to outlining the general construction with dimension tables, this leaflet shows a number of typical combination drives.

**Bausch & Lomb Optical Co.,** Rochester, N. Y.—The B&L Abbe Refractometer and Dipping Refractometer are described and explained in Catalogue D-202. The theory, design and practice of these instruments are well covered, and there is other interesting information — comparison tables, price tables, etc., as well as illustrations and drawings.

**Brown Instrument Co.,** Philadelphia, Pa.—A new folder illustrates and briefly describes this company's air-operated controllers recently introduced. It carries a message of performance—tells why engineers like the Air-O-Line.

**Exact Weight Scale Co.,** Columbus, Ohio—"Industry at Work" is the subject of an attractive booklet recently issued by this company. This booklet is a pictorial presentation with explanatory captions showing the company's exact weight scales at work in many industries. The potential applications for this scale will be of interest to any manufacturer interested in exact weighing.

**Falk Corporation,** Milwaukee, Wis.—Two new bulletins recently issued by this company feature Falk Speed Reducers. Bulletin 1100 is devoted to Falk herringbone speed reducers (parallel shafts). No. 2100 features Falk right angle speed reducers (horizontal and vertical). Both of these bulletins contain 56 and 60 pages, respectively. They are very complete with specifications, selection data, rating tables and pages of illustrations showing typical installations including paper and pulp mills.

**Farrel-Birmingham Co., Inc.,** 22 Main St., Ansonia, Conn.—This company will very shortly release a booklet entitled "Government Interference with the American Industrial System," which is No. 17 in a series of booklet-editorials. A transcript of this booklet by Allen W. Rucker, in collaboration with N. W. Pickering, president of the company, has just been received. Undoubtedly many business executives who have read some of this company's previous publications will be looking forward to seeing this booklet.

**R. Fuess, Inc.,** 245 West 55th St., New York City—"Precise Determination of Paper Smoothness with The Bekk Tester" is the subject given to a new folder just released by this company. The subject material in this folder is devoted to the idea of co-operation between the paper mill and the printer and the function of the Bekk Tester in bringing about this co-ordination is suggested.

**Goulds Pumps, Inc.,** Seneca Falls, N. Y.—A new bulletin discusses the Goulds Centrifugal Pumps for Chemical Processes, Fig. 3605. The extensive applications of this pump include the handling of caustic liquors, green and black liquors for the digesters and recovery processes in soda and kraft mills. Uses in other basic industries are given. There is a considerable amount of text, which although condensed is very complete and covers all details of design and construction. There is also a diagrammatic drawing showing a cross-sectional view with construction details explained with figures.

**Leeds & Northrup Co.,** 4934 Stenton Ave., Philadelphia, Pa.—A silver anniversary publication to celebrate its 25th year of existence has just been released. It is bound with a black cover and printed with silver, and is devoted to Micromax Thermo-couple Pyrometer. This 52-page catalogue is written in simple, non-technical language and is well illustrated. It explains the potentiometer method of measurement and the operation of the mechanisms. The catalogue is replete with valuable information and is designated as N-33A.

**Lewis-Shepard Co.,** Watertown, Mass.—A small circular, No. 320, features unusual mechanical lifters for product manufacturing and handling, especially hard-to-handle products. Devices are illustrated for lifting and moving cable, rolls, reels, drums, barrels, boxes, tanks, etc.

**Link-Belt Company,** Chicago—New literature just released by this company includes: A 24-page book, No. 1557, in which are tabulated the many cut-tooth sprocket wheels which are now available with Silverlink finished-steel chains from stocks carried at the company's plants and warehouses and by authorized distributors. Also a 16-page illustrated Book No. 1552 covering the company's "RC" Silverlink conveyor chains operating over cut-tooth sprocket wheels. There are complete dimensions, weights, ultimate strengths and list prices. Three pages are devoted to tabulation of cut-tooth sprocket wheels which are available for each size of chain. Copies may be had by requesting from Chicago or the Indianapolis, Ind., office of the company.

**Mason-Neilan Regulator Co.,** 1190 Adams Street, Boston, Mass.—This company has instituted a new plan for keeping the field informed of its progress by issuing the news of its latest developments in the form of a newspaper called the "Instrument & Regulator News." The first copy has been received and is indeed an auspicious beginning. It is not stated just how often the company plans to issue this publication. There are many illustrations and a great deal of interesting material. Copies may be had by addressing the company.

**Norton Company,** Worcester, Mass.—An attractive booklet is entitled "Facts About Metal Polishing." Considerable attention has been given to the material included in this little booklet. The text is concise, but complete; the book is well laid out and organized into sections for systematic perusal. Each phase of the subject is treated in a separate chapter and there are pictures to amplify each division. The booklet is printed in color with a touch of the modernistic.

**Oliver United Filters, Inc.,** 351 California St., San Francisco, Calif.—"Olivite Aci-Handling Pumps," manufactured by this company, have been treated in a new folder, Bulletin No. 302. The construction of the pump is covered by a description of each of its component parts. The process industries which offer applications for this pump are given, and there are a number of illustrations.

**J. E. Rhoads and Sons,** 35 N 6th St., Philadelphia, Pa.—A new folder offers condensed information on this company's complete line of belting, belt dressing and leather packings. In addition to the descriptive text there is a page of tables giving some helpful data and comparative figures on the subject.

**Jos. T. Ryerson & Son, Inc.,** Chicago—A very complete General Data Book has just been sent out by this company. The book is a handy size—4½" x 8½"—and contains 192 pages and cover. The data has been prepared to assist customers in securing and properly handling special steels. Although the information is necessarily condensed, it covers most of the practical applications. Copies will be sent to interested executives if requested on their letterhead.

**SKF Industries, Inc.,** Front St. and Erie Ave., Philadelphia, Pa.—The use of SKF bearings for the dryer section of paper machines is depicted in a recent bulletin. Ten advantages of SKF bearings as claimed by the manufacturer for application to the dryer section are listed. There are illustrations of the dryer section of two newsprint machines equipped with SKF bearings. There are also a number of diagrams. One page is devoted to a partial list of some of the mills where machines are SKF equipped, giving the number of machines and the size.

**Standard Paper Mfg. Co.,** Richmond, Va.—One of the most unique and valuable service plans to be used by a paper manufacturer has been brought out by this company to promote its "Sulgrave" brand. This is called the Sulgrave Dummy Selector, which at a glance will sell its service to all who plan or produce printing. The specimen dummy included is one of the 56 selections in the Sulgrave Dummy Service, comprising 12 standard sizes and covering a wide range of colors and combinations of colors. The Selector has a stiff paper cover and is bound with one of the new patent bindings, making it very attractive.

**Taylor Instrument Companies,** Rochester, N. Y.—Two new bulletins published specifically for those associated with paper manufacture have just been received. Bulletin 98108 is entitled "Facts from the Grinder Room," and includes data developed by this company after several years of successful operation of Taylor Control Systems on all types of grinders. Bulletin 98104 is devoted to the subject "The Taylor Beater Roll Pressure Recorder." Graphic figures show a typical installation of a Taylor Beater Roll Pressure Recorder, indicate roll adjustments and point out comparative variables.

**Worthington Pump and Mach'y Corp.,** Harrison, N. J.—New bulletins recently issued by this company include: S-500-B22 featuring the Worthington Vertical four-cycle Diesel engine; L-620-B16 which is devoted to Worthington vertical two-stage compressors; and W-321-B9 which gives a rather complete outline of the principle and design of the MONOBLOC pump. These bulletins include descriptive matter, illustrations and informative data on the respective subjects.

**Yale & Towne Mfg. Co.,** 4530 Tacony St., Philadelphia, Pa.—A new miniature hoist catalogue covers this company's complete line of Yale overhead materials handling equipment, including Yale spur geared, screw geared and differential chain hoists; trolleys; electric hoists, etc. There is considerable information packed into this little booklet, and copies may be had upon request.

### BOOKS

**Psychology of Human Relations for Executives**—This book, written by J. L. Rosenstein, a consulting psychologist, treats of a subject that is of paramount importance to anyone who guides the efforts of others. The purpose of the book is four-fold: (a) to serve as a basis for study and analysis of human behavior; (b) to show leaders in industry how the teachings of psychology may be used in solving human problems which confront them; (c) to teach executives how to use psychology in dealing with themselves and others; (d) and to help executives achieve an analytical and constructive attitude toward human inter-relationships as they exist in industry. The treatment covers nearly 300 pages of material that is conveniently arranged in eight major sections further sub-divided into chapters which total forty-seven. The subjects discussed in the eight major divisions of the book answer such questions as: "Why do people do as they do? How do people go at their difficulties? What is the thing called Personality? What does the job mean to the worker? What about co-operation and discipline? What is there in psychology? What are some things which executives have overlooked? What are some practical considerations and how can they be put into action? The book, priced at $2.50 per copy, is published by the McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York City.

## ◆ High Quality Papers to Feature Technical Summer Meeting

In accordance with the excellent reputation that has been built up over a period of years by the Canadian Technical Section and the Technical Association of the Pulp and Paper Industry, a program of papers has been assembled to be presented at the Joint Summer Meeting of these two great technical organizations. No pulp or paper company can afford not to be represented. The entire program will prove of value to mill managers, chemists, engineers and superintendents, the classes of men who are members of these organizations.

The program for Monday, August 3rd, at the Mount Royal Hotel, Montreal, P. Q. is as follows:

9:30 a. m. Symposium on High Speed Paper Machine Operation; H. J. Rowley, Anglo-Canadian Pulp & Paper Company, presiding.

The Development of the News Print Industry, by R. S. Kellogg.

High Speed Paper Machine Operation, by W. T. Bennett.

The Type of Groundwood Needed for High Speed Paper Machine Operation, by L. E. Kendall.

Sulphite Pulp Requirements for High Speed Machines, by R. T. Steedman.

2:30 p. m. The Vacuum Drying of News Print on High Speed Machines.

At 7:00 p. m. on Monday the conventioners will board the S. S. Quebec and sail to Quebec where first-hand observation can be made of the points brought out in the symposium on high speed machine operation. Visits will be made to the Anglo-Canadian Pulp and Paper Company's mill when many new developments may be viewed. For those interested, the board mill of the Donnaconna Paper Company can also be visited.

The party will proceed on Tuesday evening by boat to Baggottville, P. Q. with a brief stop at Murray Bay. From Baggottville, a train will take the party to the famous Riverbend Mill of Price Bros. Company when vacuum drying of newsprint at high speed can be seen. Visits will also be made to the Port Alfred Pulp & Paper Company mill, to the Arvida plant of the Aluminum Company and to the great power development at Isle Maligne of the Saguenay Power Company.

On the return trip an excellent program of papers has been arranged as follows:

9:30 a. m. Grellet N. Collins of Stevens & Thompson Paper Co., presiding.

Nature of Certain Lignin Derivatives, by F. E. Brauns, Institute of Paper Chemistry, Appleton, Wis.

The System of Rosin Size, Alum and Fiber as Related to Problems in Paper Making, by S. J. Robinson (by title).

The Relation between Growth Conditions, Wood Structure and Pulping Qualities, by C. E. Curran, Forest Products Laboratory, Madison, Wis.

What Constitutes Validity of Patents, by C. W. Rivise.

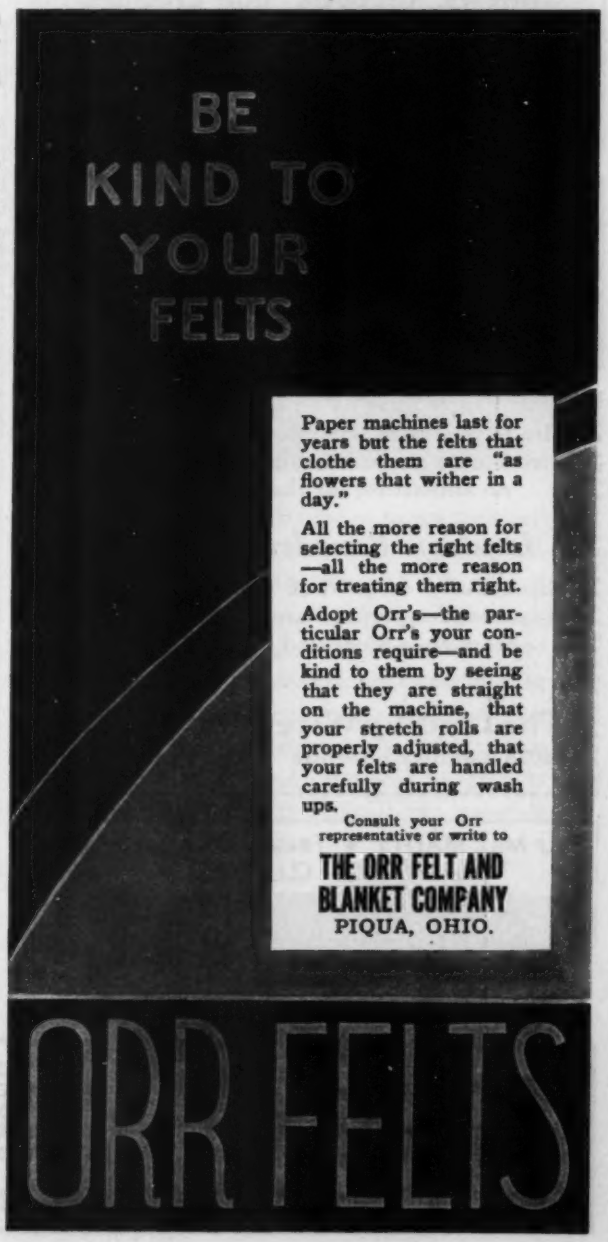
Recent Developments in the Field of Coated Paper, by O. W. Callighan, Edgar Bros. Company, Metuchen, N. J.

Recent Determinations Relative to Physical Characteristics of Paper and Ink to Accomplish Particular Results, by C. F. Clarkson, International Printing Ink Corp., New York.

Study of the Effect of Hemicelluloses on the Beating and Strength of Pulps, by H. F. Obermanns, Jr., Hammermill Paper Co. (tentative).

The boat will dock in Montreal at 4:00 p. m. Friday, August 7th, and provision has been made to inspect the laboratories and paper mill of the Research Institute at Montreal on Friday and Saturday.

Nearly 300 have made reservations for the meetings and cruise. Anyone interested may attend. Reservations should be made direct with Leo S. Tobin, 1409 Peel Street, Montreal,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### ◆ Stream Pollution Legislation

Congress adjourned without enactment into law of any one of the stream pollution bills despite vigorous attempts by members of both the Senate and the House to obtain action on specific bills. Last minute attempts were made in both Houses but lack of unanimous consent for consideration upon the floor of the Senate, necessary under the rules at the time, prevented an agreement between the Houses on a specific bill.

A brief resumé, compiled and issued by the American Paper and Pulp Association, will indicate the extent to which action was attempted during the closing hours of Congress.

The Senate Committee on Commerce reported the Barkley Bill to the Senate floor on June 3rd. The Copeland and Lonergan Bills were reported on June 4th. After failure to obtain unanimous consent to consider the Barkley Bill, Senator Barkley awaited an opportune time, called it up again, and it was passed. Senator Lonergan, whose bill provided for drastic control measures, was at lunch at the time this action was taken. On June 8th Senator Lonergan moved to reconsider the vote by which the Barkley Bill was passed. This had the effect of placing the Barkley Bill on the reconsideration calendar until such time as Senator Barkley asked for further action. Senator Barkley did not ask for further action.

Senator Lonergan notified members of the Committee on Commerce to be on the floor of the Senate at two o'clock on June 20th to take action on any stream pollution bill then under consideration. A motion for unanimous consent to consider the Lonergan Bill was objected to.

In the meantime the House Committee on Rivers and Harbors had reported the amended Vinson Bill favorably to the House. Parliamentary rules prevented immediate action except through suspension of rules. Representative Vinson on June 19th had apparently given up hope of action because of the situation in the Senate.

On the last day of Congress, shortly after noon, Representative Mansfield, Chairman of the Committee on Rivers and Harbors, attempted to call the Vinson Bill up in the House by unanimous consent. Representative Holmes of Massachusetts objected and the motion failed. At four o'clock, however, Representative Mansfield was recognized and he moved to suspend the rules. After a short debate, chiefly for the measure, the Vinson Bill was passed. It was immediately messaged to the Senate.

In the Senate, Senator Lonergan never left his seat despite apparent efforts of those in favor of the Vinson Bill. Knowing that Senator Lonergan would fail to approve action by unanimous consent, the bill was not called on the floor of the Senate. It died on the Vice-President's desk at eleven fifty-five o'clock that night when the Congress adjourned.

This resumé indicates clearly the importance attached to stream pollution legislation. It shows further that the Congress is apparently largely in favor of a plain study type of legislation but that there are members of the Congress, under the leadership of Senator Lonergan, who vigorously object to this type of legislation and favor restrictive prohibition type of law.

Although all proposed legislation on the subject died with the adjournment of Congress, it is practically certain that new bills will be introduced at the beginning of the next session of Congress and the possibilities are that a study type of bill will be enacted. It is by no means certain, however, that restrictive legislation of the type of the Lonergan Bill will not also be reintroduced and considered.

The Association, through its special committee on Stream Pollution, Counsel and staff carried the brunt of the fight to defeat restrictive legislation. It not only played an important part in getting before the various Congressional Committees the problems that the industry faces in reducing pollution, but it aroused other interested industries to the seriousness of the situation. The fact that effort was finally concentrated on the study type of legislation is due almost entirely to the Committee's activities and especially to those of the Association's Counsel.


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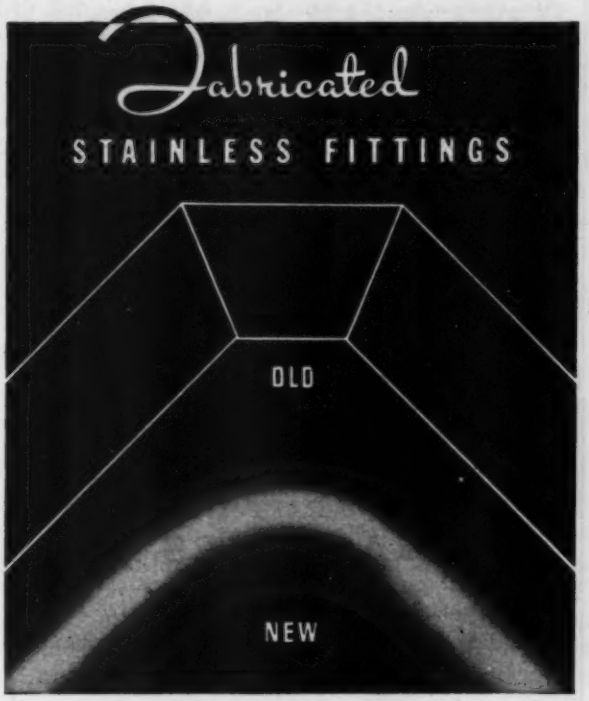


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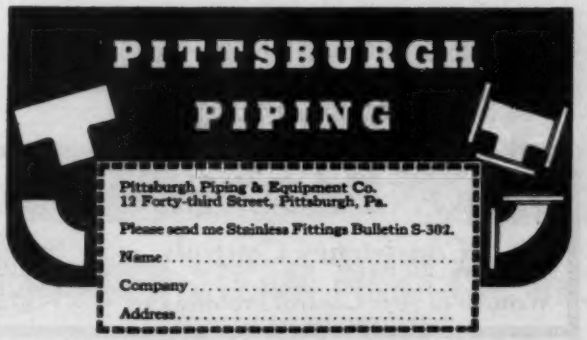

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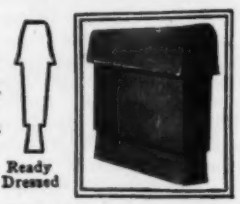
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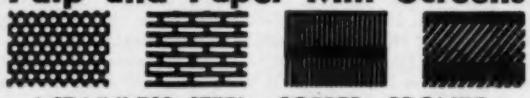

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# The Paper Industry Safety Contest

## July 1, 1935 to June 30, 1936

## Cumulative Scores as of May 31

## 18 Perfect Scores

**PERFECT SCORES**

**Division I—Paper and Pulp Mills**

| | PARTICIPANT | MILL | LOCATION |
|---|---|---|---|
| GROUP A | Hollingsworth & Whitney Co. | Algonquin & Taconnet | Waterville, Me. |
| GROUP B | | | |
| GROUP C | Continental Paper & Bag Corp. | York Haven | Pennsylvania |
| | Finch, Pruyn & Co., Inc. | Glens Falls | New York |
| | International Paper Co. | Little Island | No. Tonawanda, N. Y. |
| GROUP D | Harriman Company | Harriman | Tennessee |
| | International Paper Co. | Webster | Orono, Maine |
| | Hollingsworth & Whitney Co. | Aroostook & Cobbossee | Gardiner, Me. |
| | Bird & Son, Inc. | Phillipsdale | Rhode Island |
| | U. S. Gypsum Co. | No. Kansas City | Missouri |
| | Central Fibre Prods. Co. | Vincennes | Indiana |
| | Spaulding Fibre Co., Inc. | Milton | New Hampshire |
| | Hollingsworth & Whitney Co. | Abenaquis | Madison, Me. |
| | Mead Paperboard Co. | Rockport | Indiana |
| | **Division II—Remanufacturing** | | |
| | Union Bag & Paper Corp. | Specialty | Hudson Falls, N.Y. |
| | Kimberly-Clark Corp. | Atlas | Appleton, Wis. |
| | U. S. Gypsum Co. | Genoa | Ohio |
| | Texas Corrugated Box Co. | Dallas | Texas |
| | Bemis Bros. Bag Co. | East Pepperell | Massachusetts |

**IMPERFECT SCORES**

| | Key Number | Rank | Disabling Injuries | Frequency Rate |
|---|---|---|---|---|
| GROUP A | P- 30 | 2 | 8 | 4.546 |
| | P- 44 | 3 | 9 | 6.064 |
| | P- 27 | 4 | 18 | 6.490 |
| | P- 10 | 5 | 10 | 7.186 |
| | P- 19 | 6 | 11 | 7.794 |
| | P- 13 | 7 | 14 | 8.460 |
| | P- 18 | 8 | 16 | 8.820 |
| | P-101 | 9 | 12 | 9.363 |
| | P- 1 | 10 | 23 | 10.050 |
| | P- 62 | 11 | 20 | 10.583 |
| | P- 64 | 12 | 19 | 12.350 |
| | P- 60 | 13 | 21 | 12.779 |
| | P- 12 | 14 | 17 | 12.843 |
| | P- 67 | 15 | 29 | 12.944 |
| | P- 2 | 16 | 17 | 13.410 |
| | P- 78 | 17 | 18 | 13.853 |
| | P-102 | 18 | 25 | 13.867 |
| | P- 23 | 19 | 19 | 14.565 |
| | P- 73 | 20 | 38 | 20.149 |
| | P- 95 | 21 | 26 | 20.952 |
| | P-114 | 22 | 33 | 24.432 |
| | P- 40 | 23 | 30 | 26.231 |
| | P- 87 | 24 | 44 | 29.139 |
| | P- 74 | 25 | 67 | 36.070 |
| | P- 71 | 26 | 75 | 58.855 |
| GROUP B | P- 70 | 1 | 1 | .943 |
| | P- 15 | 2 | 1 | 1.183 |
| | P- 22 | 3 | 4 | 4.282 |
| | P- 68 | 4 | 4 | 4.417 |
| | P- 11 | 5 | 4 | 4.687 |
| | P- 51 | 6 | 4 | 5.431 |
| | P- 31 | 7 | 7 | 6.921 |
| | P- 26 | 8 | 8 | 7.742 |
| | P- 72 | 9 | 6 | 9.007 |
| | P- 21 | 10 | 9 | 9.003 |
| | P- 25 | 11 | 13 | 11.877 |
| | P-112 | 12 | 9 | 12.249 |
| | P- 54 | 13 | 10 | 12.985 |
| | P- 60 | 14 | 12 | 14.409 |
| | P- 3 | 15 | 11 | 14.758 |
| | P- 16 | 16 | 14 | 17.310 |
| | P- 82 | 17 | 16 | 18.043 |
| | P- 45 | 18 | 25 | 30.139 |
| | P-104 | 19 | 24 | 34.792 |
| | P- 76 | 20 | 27 | 37.302 |
| | P- 32 | 21 | 50 | 45.653 |
| | P- 77 | 22 | 47 | 60.026 |
| GROUP C | P- 97 | 4 | 1 | 2.768 |
| | P- 52 | 5 | 2 | 4.044 |
| | P- 46 | 6 | 3 | 5.097 |
| | P- 55 | 7 | 3 | 5.157 |
| | P- 61 | 8 | 4 | 8.939 |
| | P- 59 | 9 | 6 | 9.374 |
| | P- 43 | 10 | 4 | 9.814 |
| | P- 47 | 11 | 5 | 12.154 |
| | P- 17 | 12 | 7 | 16.081 |
| | P- 37 | 13 | 9 | 17.143 |
| | P- 88 | 14 | 10 | 17.397 |
| | P- 41 | 15 | 9 | 19.186 |
| | P- 29 | 16 | 10 | 19.354 |
| | P- 49 | 17 | 7 | 19.427 |
| | P- 48 | 18 | 10 | 20.628 |
| | P- 34 | 19 | 9 | 22.248 |
| | P- 89 | 20 | 11 | 22.286 |
| | P-103 | 21 | 9 | 24.704 |
| | P- 4 | 22 | 16 | 25.315 |
| | P- 75 | 23 | 14 | 25.399 |
| | P-111 | 24 | 11 | 25.625 |
| | P- 14 | 25 | 15 | 41.768 |
| | P- 33 | 26 | 20 | 41.977 |
| | P-113 | 27 | 29 | 53.178 |
| | P- 50 | 28 | 23 | 67.651 |
| GROUP D | P- 7 | 10 | 1 | 3.563 |
| | P- 92 | 11 | 1 | 7.917 |
| | P- 66 | 12 | 1 | 10.805 |
| | P-115 | 13 | 1 | 11.591 |
| | P- 53 | 14 | 3 | 15.001 |
| | P-117 | 15 | 4 | 16.132 |
| | P- 81 | 16 | 4 | 16.551 |
| | P-116 | 17 | 6 | 20.029 |
| | P- 8 | 18 | 3 | 21.283 |
| | P- 42 | 19 | 4 | 21.967 |
| | P- 90 | 20 | 4 | 22.227 |
| | P- 65 | 21 | 3 | 22.772 |
| | P- 6 | 22 | 7 | 23.664 |
| | P- 85 | 23 | 2 | 28.801 |
| | P- 36 | 24 | 6 | 29.484 |
| | P- 98 | 25 | 8 | 30.046 |
| | P-118 | 26 | 7 | 31.737 |
| | P- 94 | 27 | 9 | 34.869 |
| | P- 80 | 28 | 11 | 38.802 |
| | P- 24 | 29 | 8 | 46.205 |
| | P-106 | 30 | 13 | 47.408 |
| | P- 99 | 31 | 8 | 52.615 |

No May or April Report: Int. Paper Co., No. Tonawanda, N. Y.

No May Report: P-78, P-14, P-111, P-81, P-80, P-24, R-18.

**DIVISION II**

| | | | |
|---|---|---|---|
| R- 5 | 6 | 5 | 5.275 |
| R- 11 | 7 | 1 | 5.588 |
| R- 20 | 8 | 8 | 8.404 |
| R- 9 | 9 | 2 | 8.722 |
| R- 3 | 10 | 2 | 8.768 |
| R- 2 | 11 | 7 | 9.494 |
| R- 6 | 12 | 11 | 9.715 |
| R- 18 | 13 | 3 | 10.989 |
| R- 21 | 14 | 10 | 12.649 |
| R- 1 | 15 | 5 | 13.586 |
| R- 10 | 16 | 10 | 19.452 |
| R- 14 | 17 | 4 | 35.934 |

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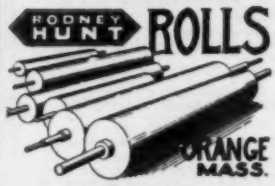


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# POWER

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**This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.**

By W. S. JOULE

### ◆ The Factory Electrical Engineer

While there is a growing recognition of the value of the electrical department in mills and factories, the managements frequently do not assign to this department the broad field that it deserves. Very often the man who is charged with the responsibilities of proper utilization of electrical energy and electrical maintenance in the plant will be found in an unsightly office in the repair shop. Here his entire time is taken up with the never-ending, petty details of maintenance—details that might better be left to the handling of a subordinate.

The large problems of economies, proper selection of equipment and general policy of the department are, under such a system, neglected in the mass of detail connected with operation. Since the possible economies of a well-organized electrical department show up in a reduction in cost of product through increased production, the head of this department should occupy a position on a par with the works manager, or at least a first assistant, with an office in the section devoted to executive work. Instead of bearing the non-descriptive trade designation of chief electrician, he should carry the title of mill, factory or works electrical engineer and possess the experience that merits this title. A man of no unusual qualifications so situated and studying the economies of production from the standpoint of electrical operation, can justify a very attractive salary in possible annual savings, even in a moderate-sized plant.

### ◆ When Should Equipment Be Renewed

It is an extremely difficult matter to prescribe a definite set of rules governing the exact amount of wear or deterioration which should take place before renewals of equipment are made; also the amount of elaborateness of repairs necessary at any given time. These things are, in most cases, a matter of judgment.

The observation of inspection records, however, should furnish a satisfactory approximate guide in recommending renewals and repairs. If the records are complete, they will show the condition of any given piece of apparatus and its part at each inspection; also the repairs and renewals made either at times of inspection or in emergency cases. Knowledge of this character covering a number of inspections should usually prove sufficient to determine the advisability of making immediate renewals or of postponing them until a subsequent inspection. This will automatically fix the point of best economy, which lies somewhere between the theoretical upper limit of maintaining everything in a new condition and the lower limit of allowing apparatus or parts thereof to fail before making repairs and renewals.

It is very often the case that necessary maintenance work is neglected or postponed because of overloaded plant conditions or through a false idea of economy, but in either case a resulting failure is likely to cost a great deal more in loss of service as well as money than the cost of proper maintenance. A typical instance of an attempt to economize on necessary repairs and renewals which had serious results was one in which the boilers of a certain plant were permitted to reach such a bad condition that the slightest forcing caused excessive foaming. Quantities of scale and sediment and slugs of water were sent over into the turbine, and the inevitable shutdown occurred with much damage to the turbine and considerable loss of service.

### ◆ Checking Up on Coal Used

Systems employed for the measurement of fuel, particularly coal, depend to a large extent upon local conditions. The size of the plant, the quantity of fuel used, the type of fuel, the method of delivery and storage and the method of firing are some of the factors which determine the system of coal measurement at any plant. Weighing equipment is conveniently divided into three classes: that for weighing the coal as received, that for weighing the coal as it is consumed by each boiler unit and that for weighing or measuring the total amount of coal consumed.

Coal deliveries are, as a rule, weighed on receipt, while a record is also kept of the total daily consumption. These two weighings or measurements will furnish a basis for calculating the reserve stocks.

Wagon scales, track scales, weighing hoppers, coal meters and conveyor weighers are usually used for checking deliveries, while for determining the amount used each day, in addition to the foregoing devices, there is also available the traveling weigh larry.

Conveyor weighers are used to weigh coal while in motion on conveyors and operate continuously while the fuel is being handled. There is also another type of device in use for the measurement of coal, generally known as a coal meter.

### ◆ Dangers of Deferring Maintenance

An epidemic of accidents resulting in interruptions to service has broken out in many plants. Electrical and mechanical weaknesses are the immediate causes of these troubles, and these weaknesses have developed because the usual program of maintenance and replacement was deferred owing to the depression and to the subsequent hesitation in buying apparatus for replacement. It is better to replace inadequate or obsolete equipment than to defer the maintenance program longer. Hence the immediate future should see many plants thoroughly inspected with the object of marking for rapid replacement apparatus likely to fail. Reliable service must be maintained at any cost. Service is the shibboleth of industry, and proper maintenance not only makes for increased reliability of service, but pays as well. It would be just as unreasonable to expect a full day's work from a weak and starving man as it would be to depend for service on crippled equipment.

### ◆ Check Up on the Smoke

In these days when almost every city has in force a smoke abatement law to compel the elimination of smoke, it behooves the power plant operator to keep his stack clear. This does not mean, however, that he is merely to open his ash-pit doors and admit excess air without having some idea as to the quantity of air involved. It is a comparatively simple matter to burn almost any kind of fuel in any kind of furnace if plenty of air is used. Excess air is productive of enormous waste by throwing away heat up the chimney. Consequently, it is necessary to keep the amount of excess down to a minimum—down to the point where carbon monoxide and smoke just begin to form. There is a very scant latitude between highest furnace efficiency and a smoking condition of the stack, and hence it is desirable that some means be provided to keep track of the condition of the flue gases as regards smoke density.

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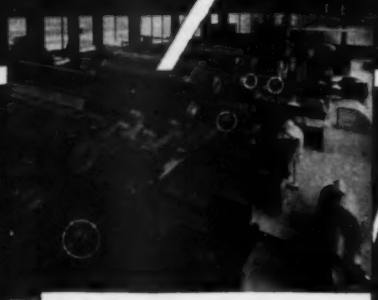

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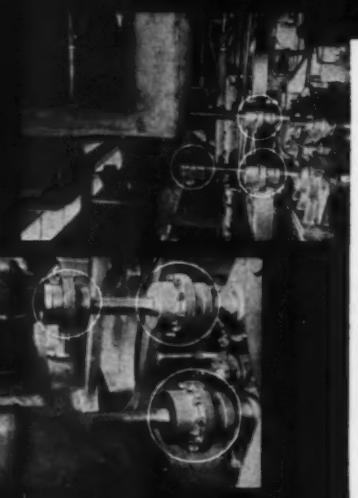

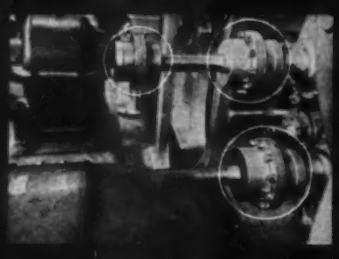

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# TECHNICAL DEVELOPMENTS

**The following abstracts are of the latest developments found in the foreign press.**

## IN THE PAPER INDUSTRY

### ◆ 3-Stage Pulping Process

The success of De Vains and that of Pomilio and Cataldi in pulping straw, bamboo, etc., by treatment with elementary chlorine naturally led to numerous attempts to apply the same process to wood. All of these, however, resulted in failure because the lignified woody structures are more resistant to penetration than the so-called "pectocelluloses" of the grasses, etc. The latter are readily softened by preliminary treatment with alkali at ordinary atmospheric pressure which can therefore be applied in a continuous process. With wood chips, however, it is necessary first to cook under pressure and this demands a batch system. If the wood must first be cooked to pulp, we already have a 3-stage system in the modern method of bleaching kraft or hard cooked sulphites by means of chlorination followed by hypochlorite bleaching.

Now it has been found possible to secure high yields of pulp useful for certain purposes by cooking only slightly, either with acid sulphite or an alkaline liquor, and then disintegrating the softened chips into a pulp mass by mechanical treatment in rod mills, or other suitable equipment. When such chemically softened wood is subjected to treatment with elementary chlorine the penetration is very rapid, practically instantaneous, and the shrinkage is remarkably low. The bulkiness of the disintegrated material is not a serious difficulty because the chlorination can be effected continuously in a rubber lined pipe. After washing and thickening, the chlorination may be repeated if necessary. Or treatment with dilute alkali may be applied. This is followed by hypochlorite bleaching, which may also be made continuous. Further treatment, i. e., washing, thickening, beating, etc., will not differ from what is customary. This 3-stage process offers the following:

**Advantages**

(1) *Universal applicability* — The chlorination step may be applied to any woody material regardless of the chemicals used for softening the chips or the mechanical treatment chosen for effecting their disintegration. Even for reedy materials such as bamboo, for which direct chlorination may be employed, it is possible to effect an overall economy by first softening the material with less expensive chemicals.

(2) *High Yields*—In the customary sulphite cook the hemicelluloses are almost completely removed by hydrolysis. In pre-cooking merely to soften the chips, these remain intact and add to the yield. Thus from spruce or fir it is possible to obtain 50 to 55 per cent instead of 42 per cent by the ordinary sulphite cook; and from hardwood 58 per cent instead of only 40 per cent.

(3) *Improved Strength*—The cementing effect of the hemicelluloses makes a stronger sheet. Even from the short-fibered hardwoods it has been found possible to attain a tensile strength comparable to that of ordinary sulphite pulp. In one instance, for example, from red beech a breaking length of 9.8 km. at 80 deg. Schopper-Riegler was obtained.

(4) *Quicker Hydration*—The hemicelluloses aid in formation of cementing material, thereby shortening the beating time and saving power.

(5) *Utilization of Cheaper Wood*—Hardwoods and waste from wood using industries, or from forestry operations, may be employed provided the material is not in such state that the fibers are broken or shattered as would be true of sawdust, planer shavings, etc. This is important for Germany in aiding curtailment of pulpwood imports.

(6) *Saving in Sulphur or Alkali*—Since a less concentrated sulphite acid, or alkaline liquor, is used in pre-cooking than in the standard cooking process, there is a saving in chemical at this stage. In the case of sulphur this saving is of importance to the German national economy, since this material must be imported whereas chlorine can be produced from native salt.

(7) *Saving in Steam*—The less drastic pre-cook requires less steam and yields more pulp than the standard cook.

(8) *Saving in Digester Investment*—The larger yield per cook means smaller investment is required per ton of pulp produced.

**Disadvantages**

(1) *Increased Total Chemical Cost*—Since chlorine costs more than sulphur, or alkali.

(2) *Site Limitation*—Since chlorine can be made electrolytically more cheaply than it can be bought, it is necessary for maximum economy to locate the mill only where cheap salt and power are obtainable.

(3) *Complication of Process and Increased Manufacturing Cost*—The cost of installation, amortization, operation and maintenance of a battery of electrolytic chlorine cells is greater than for a sulphur burner.

(4) *Increased Power Demand*—The disintegration of the softened chips adds materially to the over-all power requirement.

(5) *Marketing Problems*—(a) the by-product caustic soda must be disposed of; (b) a new type of pulp must be introduced to the trade.

A consideration of the factors listed above indicates the general applicability of the proposed 3-stage pulping process will necessarily rest on compromise. That is to say, on judiciously balancing the various factors against one another. Thus the degree of pre-cooking must be governed by cost of power for disintegration, saving in wood cost (both as to type of material used and increased yield), and over-all cost of chemicals including chlorine. The advantages claimed for pulp quality, such as quick hydration and improved strength, will also need to be taken into account. For some specialties an improvement in suitability of the pulp could be made to absorb the increased cost of power and chemicals if these are not fully compensated by the decreased wood cost. Thus by using a soda-base acid for pre-cooking a sulphite mill might produce what is virtually a white kraft.

R. Runkel, "Die Zellstoff-Faser," March, 1936, p. 33.

### ◆ Sulphate Pulp Extracted from Tannin Wood

If the wood has been barked it is suitable for papers of superior quality, especially when mixed with pine pulp. For lower grade papers the unbarked wood can be used, provided again some pine pulp is mixed with it. The moisture content is not a matter of prime consideration when the wood is to be cooked by the sulphate process. Identically the same results are obtained with a moisture content of 30 per cent and one of 60 per cent. Chip size also is relatively unimportant provided the big pieces and the sawdust and fines are eliminated.

For a high quality sulphate pulp either of the following sets of conditions may be used: (1) Alkali 30 per cent; time 5 hours; pressure 5 atm. (2) Alkali 30 per cent; time 4 hours; pressure 8 atm.

In the first case the mechanical properties of the paper are better, but the chlorine consumption for bleaching is also higher. On the other hand, the pulp produced by the second cooking method requires less chlorine for bleaching, a better whiteness is obtained, but the mechanical properties of the paper are not so good.

The presence of a small amount of tannic acid in the wood, which in the presence of iron stains the pulp a dark color, makes it necessary to be careful in washing the cooked pulp.

Slow bleaching requires less chlorine

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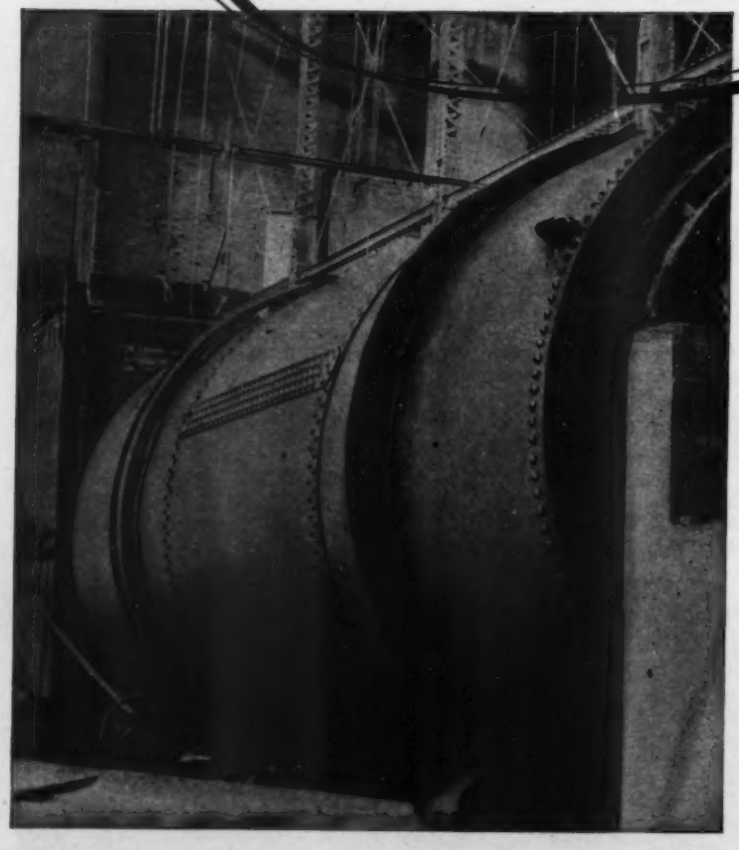

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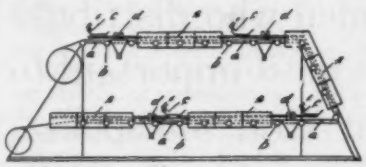
(6 per cent to 6½ per cent active chlorine reckoned on the bleached pulp), but the yield and mechanical properties of the paper are slightly inferior to those obtained by ordinary bleaching methods.

I. A. Medvedev, Materialy Inst. Boum. Prom. 1935, No. 3, from Chimie et Industrie through Le Moniteur de la Papeterie Francaise, Feb. 15, 1936, p. 89.

## ◆ Drying Surface Treated Paper

The paper web (a) is led over rolls (b); the coloring or coating or other application is sprayed on through shower pipes (c) and then spread uniformly over the surface by brushes (d). Next the paper web passes through a drying tunnel (e), which may be heated externally or provided with means for ap-

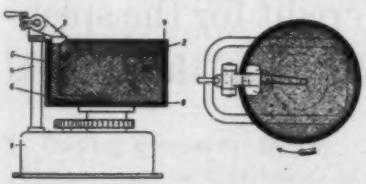


plying heat within. In order to regulate the drying temperature and provide for more than a single application of color, or other material, the drying tunnel is built in segments which telescope together and may be round or squared. After emerging from one drying section the paper web passes under another shower and set of brushes and thence into another section of the tunnel, etc.

German Patent 627,186. Kl. 55d. To Albin Kuhn. From Der Papierfabrikant, May 10, 1936, p. 95.

## ◆ Pulper

The invention consists of a vertical drum (2) on a bed plate (1) which rotates on its axis and has removable lining (7) and bottom (8), also a plow of vertical and horizontal parts (5) and (6) supported by an arm (3) attached to post (4). The surface of the plow and of the removable bottom and lining are roughened, or sharply rippled. Centrifugal force throws the material against the wall whence it is scraped off and diverted inward by the vertical part (5) of the plow. Similarly the horizontal part (6) directs the bottom layers upward. Thus a good circulation is ob-



tained and this forces the material between the greater-like surfaces of the plow and of the drum lining reducing it to pulp in the shortest possible time and with a minimum power expenditure.

German Patent 627,408 Kl. 55a to Eugen Eppler and Heinrich Raser through Der Papierfabrikant May 10, 1936, p. 95.

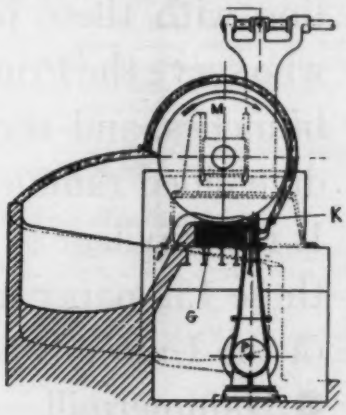
## ◆ Prevention of Molds in Groundwood and Sulphite

Both groundwood and unbleached sulphite pulps ordinarily react acid in the pH range 5.5-6.5. Various molds develop in this pH range and in the presence of air. Some (e. g., certain brown rots) are repressed when the pH of the stuff rises to 6.8 or more. This is accomplished by treatment with organic or inorganic bases, or basic reacting salts with sufficiently high pH values. Instead of bases alone buffer salts are preferably used, e. g., a base [NaOH, $Ca(OH)_2$] jointly with a salt of a weak acid like borax, alkali phosphate, alkali silicate or the like. This material is incorporated with the slush pulp or with pulp sheets by spraying.

Norwegian patent No. 55,664 to Kymmene A.-B. through Wochenblatt für Papierfabrikation, May 2, 1936, p. 340.

## ◆ Beater With Forced Circulation

The pulp is fed by pump (P) into a chamber (K) between the first and second knives of the bed plate (G) and forced into the grooves between the knives and the roll (M). The stuff is uniformly distributed over the entire width of the roll and fills up the recesses




between the roll bars very readily. It is convenient, therefore, to make these spaces as small as possible so that all the stuff contained in them may be acted upon as the roll turns past the bed plate, and then be thrown free. Thus a very uniformly beaten pulp is obtained with a power expenditure of 40 to 50 per cent of that hitherto required.

Austrian Patent 143,159. Kl. 55a. To Aldo Galliani. From Wochenblatt für Papierfabrikation Feb. 15, 1936, p. 131.

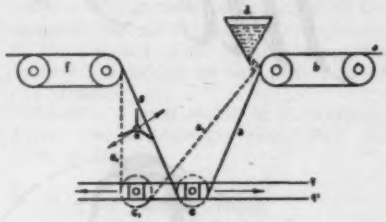
## ◆ Coating Process

The novelty consists in employing foils with an oxidized surface. This has certain properties in contrast to the ordinary aluminum foils, especially suitability to coloring, printing and variegated decorating. Further, the oxidized aluminum is very resistant to atmospheric influence and to various chemicals. Furthermore, the oxidized aluminum can be applied more solidly to the paper and board with various adhesives than can pure aluminum foil.

Swiss Pat. No. 176,370 Kl. 45f. to Peintal Co. through Wochenblatt für Papierfabrikation, Mar. 7, 1936, p. 193.

## ◆ Strewing Device

The paper web (a) runs over the table (b) and then directly under the strewing arrangement (d) to the guide roll (c), thence passing by the whipper (e) to the table (f). The novelty is the arrangement of guide rails (g, g') on



which the guide roll (c), shown also in position (c'), is carried. This makes it possible to adjust at will the angle at which the strewn material contacts the paper surface without stopping the machine. In this way any desired strewing effect may be secured.

German Patent 624,029. Kl. 55f. To Radebeuler Maschinenfabrik August Koebig G.m.b.H. From Wochenblatt für Papierfabrikation, April 18, 1936, p. 300.

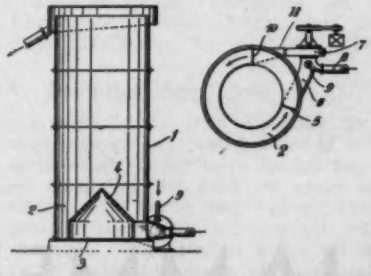
## ◆ Inhibiting Bacteria in Groundwood

Strongly pre-cooling the pulp before pressing into bales exerts a retarding influence on the development of microorganisms. This is accomplished by blowing cold air over the pulp as it comes from the wet machine or the sheet may be carried over a cooling cylinder.

Norwegian patent 55,775 to P. Piltingsrud. From Wochenblatt für Papierfabrikation, May 2, 1936, p. 340.

## ◆ Continuous Mixing of Chemicals With Pulp

At the bottom of a vertical cylindrical chest (1) is a gutter (2) from which a circulating pump (7) withdraws a portion of the pulp through pipe (6) con-



necting with the gutter at (5). A pipe (8) connects with pipe (6) on the suction side of the pump and serves for the incoming untreated pulp. Chemicals, such as bleaching agents, are fed in con-

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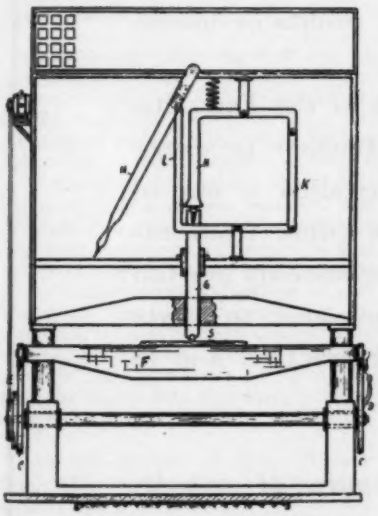
tinuously through pipe (9) which also connects with pipe (6) on the suction side of the pump. This discharges through pipe (18) into the bottom of the chest at (10). Inside the chest is a conical cap (4) surmounting the inner walls (3) of the gutter (2). This design brings about a thorough mixing of the pulp and chemicals. The height of the chest and rate of flow of incoming pulp govern the duration of the chemical treatment while the rate of flow of chemicals governs the ratio of chemicals to pulp.

German Patent 627,306 Kl. 55c. to the Kamyr Co., Oslo, Norway. Through Der Papier-Fabrikant May 10, 1936, p. 95.

### ◆ Continuous Caliper

The object to be measured (S), for example steel plate, paper, etc., is lifted by a sliding cross-piece (F) which is moved by an eccentric disc (C). This can be turned either by hand lever (D) or by mechanical drive (E). Upon lifting the sliding cross-piece (F) this and the object being measured (S) are pressed against the key (G) which actuates the pointer (N) through the links



(H, K and L). This indicates directly on a scale, or electrically upon a continuous recording chart, the thickness of the object. The caliper is provided also with a sorting device which may be actuated either mechanically or magnetically.

German Patent 623,202, Kl. 42b. To Heinrich Engels. From Wochenblatt für Papierfabrikation, Feb. 29, 1936, p. 175.

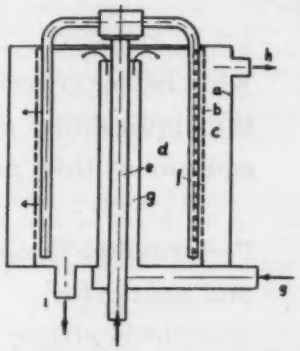
### ◆ Pulping Process for Straw

The raw material is broken up in a hammer mill or shredder into fragments of about 10mm. length. By this treatment the pieces are split open, or frayed, so that penetration by chemicals is facilitated. This material is then cooked with not more than 5 per cent of its weight of lime in 10 per cent solution without pressure, using moderate agitation. By this mild treatment a high quality pulp is obtained from straw and similar grassy materials.

Ger. Pat. 621,951, Kl. 55b to A.G. für Halbzellstoff-Industrie in Basel, Switzerland. From Der Papierfabrikant, May 3, 1936, p. 88.

### ◆ Pulp Screen

The screen consists of one or more stationary sieves (b) open at the top and placed inside an outer casing (a). Inside the sieve are revolving shower pipes (f). The raw stock inlet (g) from beneath delivers into the upper part of

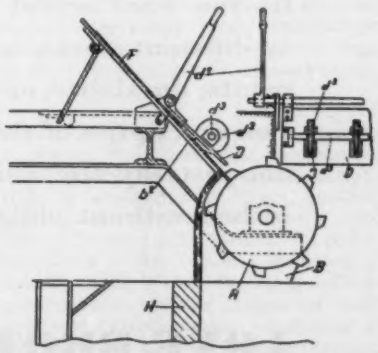


the inside of sieve (b). The accepted stock outlet (h) is in the upper part of the case (a) and the rejected stock outlet (i) in the bottom. The revolving shower pipes sweep around the entire inner wall of the screen (b). Only slight velocity of shower water is required to keep the screens clean.

German Patent 623,967 Kl. 55d to Dr. Karl G. Jonas. Through Der Papierfabrikant March 1, 1936, p. 48.

### ◆ Pulp Shredder Feed

The design permits changing over from rolls to sheets, or vice versa, with little loss of time. At one side above the shredding drum (A), which is set over a beater tub, is a plate (D) movable by a lever ($d_1$). This holds the rolls,



when such are being fed, and is shown at the right with slots (J). The sheets (F) are fed between the stationary table ($b_2$) and the plate (D). On changing over from rolls to sheets a spindle ($d_3$) bearing several feeding rolls ($d_2$) with milled edges is set in place. These press against the sheet (F) and hold it flat against the table ($b_2$) so that it cannot be jerked into the shredder all at once. The feeding rolls ($d_2$) protrude through the slots (J) of the plate (D) and are removed with their spindle when changing over to feed rolls.

German Patent 623,851 to J. M. Voith Co. From Wochenblatt fur Papierfabrikation, May 21, 1936, p. 227.

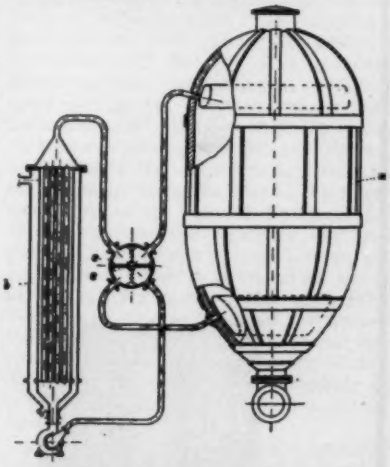
### ◆ Slime Reclamation

Clumps consisting of biological slime with an accumulation of fibers, fat, resin, etc., are collected and refined independently of the rest of the stuff to such a degree that no breaking of the sheet on the machine nor any detriment to the finished paper results when this material is added in the final step of the process.

Swedish Patent 85,383 to R. Kalberg. From Der Papier-Fabrikant, May 17, 1936, p. 103.

### ◆ Liquor Heater With Reversible Circulation

According to this invention, it is possible to reverse the flow of liquor in the digester (a) without interrupting the flow of liquor through the heater (b). Thus there is no interruption of the counter-current heat-exchange. The



digester circulation is reversed at intervals pre-determined according to conditions such as wood-quality, liquor concentration, cooking stage, etc., by means of a rotating valve (e).

Austrian patent 144,662, Kl. 55c, to Karl Peter. From Wochenblatt für Papierfabrikation, May 23, 1936, p. 396.

### ◆ Soundproofing

A loose, fluffy web of coarse fiber-stuff between two pasted liners of pulp or paper sheets serves to deaden sound by reason of the dead air space enclosed. The coarse fiber web serves to separate the liners enclosing the dead air space. This product is for use between walls and floors of apartments and houses.

German Patent 624,493, Kl. 37a, to Richard Doorentz. From Wochenblatt für Papierfabrikation, April 11, 1936, p. 281.

# Performance Talks

**What better criterion is there for judging the applicability of beating and refining equipment than *performance?***

**Performance in operation tells a dollars and cents story . . . the kind of a story that deals either with profits or losses.**

**The performance story of the FRITZ REFINING AND HYDRATING MACHINE in every mill in which it is installed is one of profits. These profits come from extremely low power requirements per ton of stock treated as compared to power requirements of usual practice, and in low maintenance cost.**

**Do you want actual figures of capacity on different stocks, horse-power requirements, durability, or any other information descriptive of this machine? If you do, just say the word. It will be furnished without obligation.**

**LOVE BROTHERS, Inc.**

**AURORA, ILLINOIS**

# PAPERMAKING PATENTS

## IN THE UNITED STATES

Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

2,033,351—Process of Manufacture of Paper. Harry Huet Nelson, Paris, and Guillaume Becker, Asnieres, France. Application July 13, 1934. Serial No. 735,090. In France July 19, 1933. 5 Claims. (Cl. 92—21). Process of sizing and impregnating cellulose material, consisting in mixing with the cellulosic pulp cellulose thixotrope formed by treating a fresh and highly viscous solution of cellulose sulfocarbonate with an acid solution consisting of a mixture of sulphurous acid and alkaline bisulphite in the requisite proportions to avoid release of sulphurous hydrogen and separation of the sulphur, such acid solution being added in just sufficient quantity to electrically discharge the aggregates of the colloid.

2,035,024—Manufacture of Paper for Toweling and Other Purposes. Milton O. Schur, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application April 6, 1931. Serial No. 528,229. 6 Claims. (Cl. 91—68.) A method which comprises dipping a porous, waterleaf web of paper into a glue solution containing less than 5 per cent by weight of glue solids and containing a tanning agent for said glue to effect a soaking of such web with the solution, squeezing the web until it contains only about its own weight of solution, and drying the squeezed web to remove its water content and to tan said glue and to render said glue temporarily water resistant.

2,035,447—System of Pulp Preparation. Charles D. Altick, Dayton, Ohio. Application July 27, 1934. Serial No. 737,244. 13 Claims. (Cl. 92—6.) The herein described method of treatment of pulp making material including severing bales of pulp material into relatively thin slices, depositing the slices in broken condition in a soak tank, saturating the material with liquid, circulating the material through the tank by withdrawing it from the bottom and reintroducing it into the top of the tank and passing the material through a pulp refiner in said circulatory path.

2,036,168—Paper Machine and Process of Making Paper. George A. Engert and George B. Gibson, Watertown, N. Y., assignors to The Sonbert Machine Company, Chicago, Ill., a co-partnership consisting of George K. Gibson, George A. Engert, and George B. Gibson. Application January 18, 1934. Serial No. 707,142. 31 Claims. (Cl. 92—38.) A feeding apparatus for de-liquefying machines comprising, in combination, a vat for receiving a pond of liquid suspensions to be de-liquefied, feed boxes on both sides of said vat, feed pipes communicating with the sides of said boxes, a rotatable cylinder in said vat, a filter medium on the periphery of said cylinder, means for draining liquid from the interior of the cylinder, means for mixing said drained liquid with the suspensions to be de-liquefied, and means for flowing said diluted suspensions to said feed boxes.

2,036,213—Treatment of Black Liquors. John Arthur Hambly, Three Rivers, Quebec, Canada, assignor to Consolidated Paper Corporation Limited, Montreal, Quebec, Canada. Application June 7, 1933. Serial No. 674,700. 9 Claims. (Cl. 23—48.) A method of recovering values from black liquor which comprises treating the liquor in a smelting chamber to form producer gas and a fused black ash, withdrawing the producer gas from the smelting chamber and removing corrosive alkali particles therefrom before subjecting it to combustion.

2,036,392—Moistureproof Paper. Leonard E. Branchen and George R. Clark, Rochester, N. Y., assignors to Eastman Kodak Company, Rochester, N. Y., a corporation of New York. Application June 27, 1933. Serial No. 619,380. 11 Claims. (Cl. 91—68.) A wrapping paper which is moisture-proof by reason of having, as moisture-proofing agents, from 1 to 10 per cent of wax homogeneously dispersed therethrough, and a coating comprising 100 parts by weight of nitrocellulose, from 45 to 85 parts by weight, approximately, of a substantially water-immiscible plasticizer, and from 15 to 30 parts by weight, approximately, of a resin.

2,037,242—Paper Machinery. Herman L. Kutter, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application October 20, 1930. Serial No. 489,888. 5 Claims. (Cl. 34—48.) In paper machinery of the character described, a hollow rotatable roll having a hollow journal shaft, driving means for said roll, said driving means comprising a gear attached to said journal shaft, a driving shaft, a driving pinion mounted thereon in meshing engagement with said gear, an enclosing housing for said driving means, a fluid conduit, and a bolt connection between the fluid conduit and the drive enclosing housing to hold the fluid conduit in fluid tight connection with the journal to provide a fluid passage from the conduit to the roll interior.

In paper machinery of the character described, a machine frame, a hollow rotatable drier roll having a hollow journal shaft providing communication to the interior thereof, supporting means for said journal shaft comprising a housing mounted on said machine frame and an anti-friction bearing supported in said housing, a hypoid gear fixed to said journal shaft closely adjacent said bearing, a driving shaft extending across but spaced from said journal shaft axis, a drive hypoid pinion mounted on said shaft and driving said hypoid gear, and means rigid with said housing rotatably supporting said driving shaft.

2,037,243—Paper Machinery. Herman L. Kutter, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application April 8, 1933. Serial No. 665,114. 11 Claims. (Cl. 92—43.) In a cylinder paper machine comprising a cylinder mold and a vat therefor, means for maintaining a body of stock at the mold surface comprising a wier, and means positioned in the stock flow and extending upwardly from the wier to the inlet stock level of the vat and forwardly to closely adjacent the screen in the initial forming zone with the portion of said means which is at the stock level extending very close to the mold surface and as close to the mold surface as the remaining part of said means for effecting a controlled positioning of the fibers to prevent them from assuming a parallel positioning as they flow onto the forming wire.

In a paper machine having a forming surface and a stationary part, deflecting means movable in the stock flow adjacent to the forming surface, said deflecting means comprising a movable portion, supporting means therefor comprising flexible members fixed to the movable portion of the deflecting means and to the stationary part of the machine, and driving means connected to the movable portion of the deflecting means for imparting an oscillatory movement thereto.

2,038,019—Mulch Fertilizer Paper. Harold E. Wright, Appleton, Wis., assignor to Central Paper Company, Menasha, Wis., a corporation of Wisconsin. Application February 18, 1935, Serial No. 7,063. 5 Claims. (Cl. 47—9). As a new article of manufacture, a moisture retaining, substantially impervious paper provided with a coating of a nitrogeneous adhesive mixed with soil corrective chemicals.

# F.C.HUYCK & SONS

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SIMONDS WORDEN WHITE COMPANY
Dayton, Ohio

# The COMMERCIAL OUTLOOK

New York, July 1, 1936.

SIGNS are accumulating that the usual summer dullness is affecting activity in the paper industry. Markets are slowing down, at least to a seasonal extent, and paper and board mills are curtailing operations in proportion to the shrinkage in outlets for the sale of their products. At this writing, many mills are closed for their customary mid-year vacation and inventory period, some halting manufacturing for several days, others for the duration of a week and still others as long as a fortnight. There have been rumblings of price disruptions, of some digression from recognized market quotational levels in the eager rush to secure additional orders.

However, on the whole the industry is in a healthy state, and marked by very gratifying production and marketing activity. The quieter situation of late is regarded as purely seasonal, and has been welcomed by many mill owners who are pleased to enjoy a breathing space after the briskness of the market during the earlier months of the year. It can be stated that the summer slowness is of distinctly milder intensity than ordinarily is encountered at this time. Demand for most lines of paper and board is holding up remarkably well; a majority of mills are better fixed with orders than usually at this season, and there is an air of confidence, if not enthusiasm, regarding the outlook for the second half of 1936, many feeling the industry will experience one of the liveliest periods over the next few months it has ever known.

Employment in the paper and pulp manufacturing industry of the United States is today larger than at any time in its history, according to a report by Charles W. Boyce, executive secretary of the American Paper and Pulp Association, to the Consumers' Goods Industries Committee and made public by the Committee. More productive workers are employed in the industry than ever before, states Mr. Boyce. As business has increased the smaller mills have found it difficult to meet customer demands on a forty-hour week basis, inasmuch as this permits only five days' machine operation per week. Some mills, chiefly to meet temporary demands during the seasonal peaks, have shifted to a forty-eight-hour week basis. It is probable that the shifts in these cases will average out, over six months' periods, to forty hours or less per week.

As a result of the increase in employment, hourly earnings and hours of work, the report continues, payrolls today are almost double payrolls during the depression. Since termination of the code, both employment and wage rates have increased and there is no reason to believe that they will not be maintained upon a voluntary basis. According to the U. S. Bureau of the Census, the paper and pulp industry employed 128,000 in 1929. Reports of member companies of the Association indicate a current employment of approximately 145,000. Employment during the lowest period in the depression dropped to 105,000 for the industry as a whole The increase since May, 1933, has amounted to 40,000 productive workers, or 40 per cent.

Maintenance of wage and hour standards on a voluntary basis has been relatively high. It is the feeling of the industry that an exceptional record has been made. This is particularly true in view of the fact that a large majority of the manufacturers are located in isolated, rural communities where the supply of labor has been relatively greater than the demand, the report concludes.

Newspaper advertising for the month of May showed an increase of 1.8 per cent over April, after due adjustments and including correction for seasonal change, according to Printers' Ink, following a rise in April of 4.3 per cent over March.

While production of newsprint in the United States in May resumed the downward trend, interrupted briefly in February, March and April, Canadian output continued to increase, and the production of 267,067 tons set an all-time high for any month in the history of the Canadian industry. The May output by Canadian mills compared with 242,693 tons in the same month last year, a gain of 24,374 tons, or 10 per cent. United States mills produced 75,719 tons during May, against 84,323 tons in May a year ago, a decrease of 8,604 tons, according to News Print Service Bureau figures. Mills in both countries turned out 342,786 tons in May, compared with 327,016 tons in the similar 1935 month, an increase of 15,770 tons, or 4.8 per cent. This total was still quite a little short of the record set in 1929, when mills in both countries in May manufactured a total of 369,148 tons of newsprint. The output by United States mills in May, 1929, was nearly 50,000 tons greater than this year.

Shipments by both countries in May ran considerably ahead of the production during the month, amounting to 286,445 tons from Canadian mills and 77,062 tons from United States mills, making a total excess of shipments over production of 20,721 tons.

During the first five months of 1936, Canadian mills produced 1,219,212 tons of newsprint, contrasted with 1,052,883 tons in the same period of 1935, a rise of 166,329 tons. This set a new record for the period for these mills, the previous high having been established in 1929, when the total was 1,086,209 tons. United States mills in the five months turned out 380,309 tons, against 384,213 tons in the first five months of 1935. The aggregate for both countries for the five months was 1,599,521 tons, against 1,437,096 tons a year ago, an increase of 162,425 tons. As a result of the excess of shipments over production in May, stocks at mills in both countries declined to 82,146 tons, compared with 102,867 tons on April 30 last.

Production of paperboard by mills in the United States continued to mount during April, and for the fourth consecutive month showed an increase over the preceding month. A total of 294,929 net tons of board was manufactured in April, comparing with 285,257 tons in the preceding month and 260,851 tons in April last year, according to the monthly summary of the U. S. Census Bureau. Production in the four months this year amounted to 1,122,221 tons, against 1,050,517 tons in the corresponding time last year, and 974,845 tons in the first four months of 1934. Board mills produced at 71.6 per cent of their rated capacity in April, contrasted with 69.4 per cent in the month before and 64.8 per cent in April a year ago. During the first four months of this year output was at an average of 68.1 per cent of rated capacity, against 66.3 per cent in the similar period last year.

New orders received by mills during April called for a total of 298,180 tons of board, against 290,854 tons in the preceding month, and unfilled orders held by mills at the end of April were for 99,796 tons, compared with 96,202 tons a month previously.

◆ ◆

◆ GEO. M. SNODGRASS, widely known in the electrical industry, has been appointed general sales manager of the Imperial Electric Co., Akron, Ohio. Mr. Snodgrass has been with Fairbanks-Morse & Company for the past 15 years, where he advanced to the position of general sales manager of the electrical division.

### ◆ Stanley M. Mercier Joins Boston Woven Hose

The Boston Woven Hose & Rubber Company announces that Stanley M. Mercier has been taken on as a member of its sales and engineering staff.

For many years Mr. Mercier was identified with the sales, engineering and construction of conveying systems for the Jeffrey Mfg. Company, Columbus, Ohio. He has been in charge of many of the largest installations in all sections of the country.

Mr. Mercier will be located at the Company's headquarters in Boston.

## OVERHEAD MATERIALS HANDLING

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**Stock handled here is of eleven grades - varying in width from 32" to 63," which gives somewhere in the neighborhood of one hundred and sixty one distinct and separate piles: piled to a maximum height of 35 feet and in such a manner that they can pick out any grade of any gauge and width desired.**

*Consult your 'phone directory under Cleveland Tramrail.*

**Results here are: increase of storage capacity per total of ground area available, avoids re-handling, eliminates damaged stock losses - Vertical piling eliminates roll flattening.**

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**Board and carton manufacturers are buying Lewellen Transmissions to meet an increasing demand for high quality containers. Attractive containers go far to sell their contents, and the Lewellen goes the limit to insure uniform production of high grade containers. The Lewellen will serve you equally well, no matter what your variable speed control problem may be. Let us prove this. Tell us your problem and let us suggest the proper installation and quote you prices. No obligation.**

**LEWELLEN MFG. CO.**
**COLUMBUS, IND.**

# Domestic RAW MATERIALS

## ◆ Papermaking Rags

The trend in rags for papermaking in recent weeks has been in a single direction—downward. Practically without exception, market changes in the various grades of rag stock—new and old—have been lower, and in some few instances the decline has been moderately sharp. Two major factors have contributed in the main to the market drop. One has been a decided contraction of demand from paper mills; the other, a fairly large increase in incoming rag supplies.

Paper manufacturers have let down in buying because of having their needs covered. Without question, most paper mills bought rags heavily earlier in the year; in numerous cases they overbought, with the result that when the rag market developed easing tendencies, they were enabled to curtail purchases to a considerable degree. Meanwhile, rag supplies began coming in from various sources in substantially larger amounts. It would seem that with the general improvement in economic conditions, and with the general public assuming a more encouraged view of the outlook, much larger quantities of old clothing were discarded, which, in conjunction with a bigger production of new cuttings by reason of more garments being manufactured, rag supplies underwent a notable increase. The market now gives every evidence of being better supplied than in a lengthy time, although the probable fact should not be overlooked that the present rise in supply represents an accumulation of several years which is now coming out and which in all likelihood may not be duplicated in some years.

Roofing rags have suffered the sharpest price recession. Domestic roofing material is down further than foreign. While felt mills are now buying so reservedly prices are mainly nominal, ruling extremely uncertain in the absence of worthwhile transactions, it is reported domestic No. 1 roofing stock is about 1.60 cents a pound in the East f.o.b. shipping points, and No. 2 domestic 1.20 cents at dealers' points. It is possible that some purchases have been accomplished even below these price levels. Imported roofing is quotable at nominally 2 cents ex dock New York for linsey garments, 1.70 cents for mid-European dark cottons and 1.55 cents for Spanish dark cottons.

Old white cottons are quoted at 3.25 cents or in that vicinity for No. 1 repacked, and 2.75 to 3 cents for No. 2 repacked at points of shipment in the East, while repacked old thirds and blues are around 2.25 cents and twos and blues 2.50 cents. New cuttings of most description have moved off further in value. There have been reports of purchases of No. 1 new white shirt cuttings by fine paper mills at 7.50 cents, perhaps at less, f.o.b. shipping points, although many dealers continue to ask in excess of this price. Fancy shirt cuttings are about 2.75 to 3 cents at dealers' points, washables 2.35 cents, unbleached muslins 7.75 cents, blue overall cuttings 6.25 cents, light silesias 5.75 to 6 cents, light flannelettes 5.75 cents, and bleached canton flannels 7 cents.

## ◆ Old Paper

Waste paper is moving well into consuming channels and at steady prices. Not many changes of important breadth have occurred lately; it would seem that consumers are absorbing supplies in large enough tonnage to take up the stock on the market, and with demand and supply about equalized, price levels are well maintained. At the moment, mill buying has decreased to some extent, as ordinarily is the case during the Fourth of July holiday and inventory period when many board and paper mills shut down for a time to effect repairs and compile mid-year inventories.

Eastern consumers are granting 25 cents per hundred pounds f.o.b. New York for No. 1 mixed paper, and 32½ cents for folded newspapers, while in the Middle West, a price of 42½ cents a hundred is named on both these bulky grades at shipping points. Old corrugated boxes are selling in the East at 47½ cents per hundred pounds at points of shipment, No. 1 heavy books and magazines at 55 cents, No. 1 old kraft paper at a cent to 1.10 cents per pound, white news blanks at 1.20 to 1.25 cents a pound, and ledger stock at around 1.10 cents for all-white and 85 cents for colored. Shavings are quoted firmly at 2 to 2.25 cents a pound for No. 1 hard white and 1.85 to 2 cents for No. 1 soft white f.o.b. shipping points, while No. 1 hard white envelope cuttings are reported bringing around 2.50 cents per lb.

## ◆ Rope and Bagging

There is little happening in old rope of interest either to buyers or sellers. Evidently some paper mills are quietly acquiring supplies but on an "undercover" basis and not divulging their operations in the market, whereas generally there is very limited demand out in the open. Prices are quotably unaltered at 2.25 to 2.37½ cents a pound on No. 1 domestic old manila rope f.o.b. dealers' points, though it is said to be difficult for mills to buy at this price level. Foreign old manila is held at 2.50 cents and higher ex dock New York or other American Atlantic ports, and importers assert they can scarcely get supplies abroad to sell at this price.

Old bagging is tending to ease and is uncertain in price currently. The technical position of old bagging of nearly all kinds appears fairly bullish but consumers are at the moment lending limited support to the market. No. 1 scrap burlap is about 1.75 cents a pound for domestic at shipping points and 1.90 cents for foreign ex dock Atlantic seaboard, while roofing bagging is nominally 1.15 to 1.25 cents, and gunny bagging within a range of 1.90 to 2 cents.

## ◆ Pulpwood

Consuming demand for pulpwood is comparatively quiet at present but a steady movement keeps up against contracts and back orders, and quotations are maintained. Those on the selling side profess to believe higher price levels will be seen during the coming season.

## ◆ Mechanical Pulp

A consistently good movement of mechanical pulp is reported, though it is mostly against contracts and old orders. Water conditions recently have been so favorable that many consumers have been enabled to grind most of the pulp they have needed, and have not operated except intermittently as buyers in the open market. There is no sign of any pressing surplus of groundwood on the market, and quoted rates are well sustained. Domestic groundwood is in the quotable vicinity of $25 or $26 a ton delivered consuming mills, depending on the length of the haul from producing plants, while Canadian prime groundwood is $26 to $31 on a delivered consuming center basis, and Scandinavian prime dry groundwood $23.50 to $24.50 per short ton ex dock American Atlantic seaboard.

## ◆ Chemical Pulp

Anyone having kraft pulp to sell for prompt or early delivery is having no difficulty finding buyers, and at strong prices. Spot lots of prime kraft have been sold up to 2.20 cents a pound, ex dock Atlantic seaboard basis, it is stated. Bleached sulphite also is very firm in price on a low quotable edge of 2.65 cents ex dock basis and in most cases 2.75 cents asked. It is understood domestic manufacturers are naming 2.65 cents as a minimum for third quarter shipments. Kraft and bleached sulphite mills are practically sold out for this year, and some are well committed far into 1937. Unbleached sulphite is 1.85 to 2 cents per pound ex dock Atlantic seaboard, and domestic bleached soda pulp holds to a price of 2.60 cents delivered book paper mills.

## ◆ Chemicals

Papermaking chemicals are generally steady in price, and selling quite freely. China clay exhibits quotable strength on a range of $13.50 to $21 per ton ex dock for imported, and $6.50 to $12 for domestic f.o.b. mines. Papermaking gum rosin is quoted at $4.60 and wood rosin at $4.50 per 280 pounds in barrels f.o.b. southern points.

◆ HAROLD HOLDEN, formerly with Paper Makers Chemical Corp., is now assistant mill manager of the Oxford Miami Paper Co., West Carrollton, Ohio.

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Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

*Made by*

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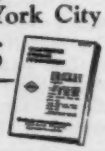

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# Import and Export MARKETS

## IMPORTS

### ◆ Wood Pulp

An exceedingly tight supply condition continues to mark imported chemical wood pulp. Not in a long while—not in years, in fact—has the market witnessed a situation of such intensity in this connection. Producing mills in Europe are completely outsold in a great many instances for this year, and some have disposed of all their output for 1937 that they care to sell for the present, especially as regards kraft pulp and bleached sulphite. There is not the pinch in available supply of unbleached sulphite, yet this class of pulp also is reaching a sold-up stage, more particularly as respects unbleached of easy bleaching qualities.

Perhaps the principal feature of the market is the strong position of kraft pulp and the decided difficulty buyers are experiencing in getting desired tonnages of such pulp. It is no exaggeration to say that numerous consumers are definitely failing to locate the kraft pulp wanted, not alone for delivery over the remainder of the current year but also for shipment from abroad during 1937. Kraft mills in Sweden and Finland are outsold for 1936. Many have contracted well into next year and are unwilling, or certainly reluctant, to accept further orders. Bids cabled over from here for 1937 supplies of kraft almost invariably elicit counter offers cutting quantities in half, or less. In other words, buyers in the United States seeking to contract, for say a thousand tons, for next year's shipment, are countered with offers of only 500 tons, or a smaller lot. The same situation, to perhaps a lesser degree, exists in bleached sulphite.

Prices on spot lots or near shipments of kraft pulp have stiffened again. There have been reports of sales of spot prime kraft at 2.20 cents per pound ex dock New York or other American Atlantic ports. About the only kraft pulp to be had on spot is said to be small parcels which importers are enabled to secure by inducing customers to forego taking delivery of incoming shipments by promising later replacements. Consumers, including both board mills and wrapping paper manufacturers, have bought heavily for this year, and in addition producers in Sweden and Finland have sold much more kraft pulp in consuming markets other than the United States.

The quotation on prime kraft for shipment during 1937 is 1.90 cents a pound ex dock American Atlantic seaboard. It is doubted whether purchases are now feasible under this price, and higher is asked in frequent cases. Prime bleached sulphite for forward shipment from abroad is 2.65 to 2.75 cents ex dock Atlantic seaboard basis, and prime strong unbleached sulphite is 1.90 to 2.05 cents with easy bleaching grades often held at 2.10 and 2.15 cents. Prime dry groundwood of Scandinavian origin is around $24 per short ton for shipment from abroad at American Atlantic ports.

As is usually and seasonally the case, imports of wood pulp into the United States during April declined compared with the several previous months, and were, in fact, smaller than in any month since April of last year. Chemical pulp importations totaled 108,982 short tons of 2,000 pounds, air dry weight, valued at $4,500,996, according to U. S. Department of Commerce statistics, comparing with 128,249 tons of a declared value of $5,072,658 in the month preceding, and 77,109 short tons of a value of $3,373,263 in April, 1935. The April receipts brought the total for the first four months of this year up to 571,623 short tons of chemical pulp, against 441,096 tons in the corresponding period last year, showing an appreciable gain this year. Groundwood imports in April were 12,415 short tons of a value of $227,861, compared with 18,265 tons of a value of $303,441 in the preceding month and making a total for four months of the current year of 61,205 short tons, against 48,274 tons in the same time a year ago.

### ◆ Paper

The United States imported paper and paper products to the value of $8,188,893 in April, 1936, contrasted with imports of a value of $8,591,724 in March this year and $7,333,474 in April a year ago. Four months' imports this year reached an aggregate value of $30,504,132, against $26,408,083 in the same time last year. Standard newsprint was imported to the value of $26,233,594 in the first four months of the current year, compared with $23,146,289 in the similar 1935 period. The next largest item, in point of total value, was cigarette paper, imports of which were valued at $1,202,503 in the first four months of 1936, against $1,073,038 last year.

### ◆ Paper Stock

Imports of rags for papermaking into the United States are registering a sharp gain this year, receipts during the first four months of the year very nearly doubling the quantity imported in the same period of 1935. Department of Commerce figures show that a total of 97,757,875 pounds of papermaking rags were imported January to April, inclusive, this year, valued at $1,448,323, contrasted with 50,389,091 pounds of a declared value of $498,420 in the corresponding 1935 period. Imports in the month of April last were 32,081,981 pounds of a value of $533,819, against 30,700,477 pounds of a value of $447,202 in the preceding month, and 18,830,249 lb. of a value of $190,256 in April, 1935.

Miscellaneous paper stock imports, including old rope, bagging, waste paper, etc., were 9,722,386 pounds of a value of $150,218 in April last, making a total for the first four months of this year of 38,836,346 pounds of a value of $624,322, compared with 20,964,757 pounds of a value of $298,654 in the same 1935 period.

## EXPORTS

Exports of paper and paper products from the United States are steadily though gradually climbing, according to official figures released by the U. S. Department of Commerce. Shipments in April last reached a value of $1,855,347 compared with $1,912,203 in the month preceding, and $1,692,976 in April, 1935. Exports during the first four months of the current year aggregated in value $7,274,678, representing a gain of 9.1 per cent over the shipments of a declared value of $6,666,873 in the same time of 1935.

Exports of newsprint paper in the first four months of the current year were valued at $270,311, against exports valued at $359,409 in the same period of 1935. Writing paper exports were valued at $680,197 in the four months, against $540,284 last year; of wrapping paper, $667,705, against $648,743; of uncoated book paper, $268,638, against $275,802; of toilet paper, $228,752, against $214,589; of greaseproof and waterproof paper, $412,439, against $352,670; of surface coated paper, $311,430, against $278,933; of old and overissue newspapers, $294,090, against $360,249; of boxboard, $473,189, against $324,638, and of other paperboard, $338,091, against $328,007. Exports of paper bags were valued at $260,142 this year, compared with $294,430 a year ago.

Exports of paper base stocks from the United States amounted in value to $3,470,302 during the first four months of 1936, contrasted with $3,618,452 in the same time of 1935. The chief item in these exports was sulphite wood pulp, shipments of which were valued at $3,027,610 in the first four months of the current year, compared with $3,021,321 last year in the corresponding period.

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